Precision Cooling for
Business-Critical Continuity

Liebert Hiross HPM

4-99 kW Indoor Room Cooling Units

AWFDH Versions

PRODUCT DOCUMENTATION

Liebert Hiross HPM – PD – 273147 – 14.07.2006

Liebert.

EMERSON
Network Power

Introduction

Liebert Hiross HPM

Liebert Hiross HPM is the new serie of air conditioners developed by **Emerson Network Power** to allow maximum flexibility of application in technological environments, from data processing centers to manned control rooms and electronic centers for telecommunication. This series includes units with a rated cooling capacity ranging from 5 to 99 kW.

Complete environmental control and reliability are paramount to ensure faultless operation of computer rooms, telecom installations, data centres and technical applications. **Emerson Network Power** products have traditionally set the industry standards. But today's world requires more than just environmental control and reliability; it requires increasingly higher levels of overall performances. While still offering unmatched environmental control and reliability, the new Liebert Hiross HPM range raises the bar of performance in Precision Air Conditioning setting new standards in terms of Energy Efficiency, Compactness and Sound emissions.

The new Liebert Hiross HPM range is available in a number of airflow versions: with upflow, downflow and displacement airflow patterns across a full range of cooling modes: direct expansion, chilled water, freecooling, dual fluid and constant (for an ultra high temperature and humidity control and air filtration).

UNDER

OVER

Contents

Emerson Network Power partecipates to Close Control Air Conditioners Eurovent Certification Programme. The performances, as total and sensible cooling capacity, power input, system EER and sound power levels are periodically checked and Eurovent certified in accordance with the relevant program procedures.

The Quality Management System of Emerson Network Power S.r.l. High Performance Air Conditioning has been approved by Lloyd's Register Quality Assurance to the standard ISO 9001:2000

The product conforms to European Union directives 98/37/CE (89/392/CEE; 91/368/CEE; 93/68/CEE); 89/336/CEE; 73/23/CEE; 97/23/CE.
Units are supplied complete with a Test Certificate Conformity Declaration and Component List.

Liebert Hiross HPM units are CE marked as they comply with the European directives concerning mechanical, electrical, electromagnetic and pressure equipment safety.

1 Features and Benefit

The new Liebert Hiross HPM range

The plug fan technology with generously dimensioned heat exchanger, scroll compressors and optimised cooling circuits, maximise efficiency by operating at low levels of energy consumption. This can be further enhanced by the use of Electronically Commutated Fans (EC Fan) reducing power input by 35%.
We underline the complete range with all models in Displacement version and in Constant configuration.

The down—flow version achieves the highest levels of efficiency (EER is 20% better than industry average). The fan in this case is positioned upstream of the evaporator optimising airflow over the coil. Also in the Under versions, silencer cartridges can be used to further reduce the sound pressure level by up to a 5 dBA.

The new Liebert Hiross HPM range has been designed to have the smallest possible overall footprint. The compactness of the unit is fully evident for some capacities. For instance:

- in the smaller sizes (S04and S05) where the air outlet plenum is integrated in the unit body in a depth of only 400 mm;
- in the S23, where 23 kW in direct expansion mode have been reached with footprint of 750 x 750 mm;
- in the M29, where 29 kW have been reached with footprint of 1000 x 850 mm
- in the M47, where 47 kW, single circuit, have been reached with a footprint of 1750 x 850 mm;
- in the M56 and M66, where in the 1750 x 850 mm footprint we have upflow and downflow configurations for air and water cooled units.
- in the L83 and L99, where in the 2550 x 890 mm footprint we have downflow configurations for air and water cooled units.

Low sound levels are the result of fan design, optimised airflows and doubled skin insulated panels.

Attention to design detail means low operational costs including product maintenance through high levels of reliability and a service friendly design. As an example, all the crucial parts of the refrigeration circuit (i.e.: thermostatic valves, sight glasses and liquid line driers) are grouped together and accessible simply by opening the front door.

Energy Efficiency

Plug—in Fan

All Liebert Hiross HPM units are equipped with plug fans: direct driven centrifugal fans with backward curved blades and an asynchronous external rotor motor. The new generation of these fans with specifically shaped blades, designed especially for the use in air conditioning cabinets, features a very high mechanical efficiency over a wide operating range. In addition, sound radiation is free of tonal noise at the impeller suction and discharge sides.

These fans are designed to have the maximum power capacity at an intermediate operating point therefore there is no risk of motor overloading. The fans are not dependent on a minimum back pressure, as is the case with most centrifugal direct driven fans with forward curved blades.
Thanks to the use of plug fans the Available External Static Pressure is adjustable on site during commissioning, with a range of 0 to 200 Pa or more, according to the installation requirements.

Features and Benefit

EC Fan (Plug—in Electronically Commutated Fan)

The largest capacity Liebert Hiross HPM units can be supplied with an exclusive fan type, this enables you to greatly increase the unit's efficiency and therefore significantly reduce operating costs.

EC fans [Electronically Commutated DC motors] have the added advantage of higher fan shaft motor efficiency: from 45% of 1— phase motors, to 65% of 3—phase motors and to 85—90% of EC fans.

Additional benefits are that, on start up, the Liebert Hiross HPM peak inrush current is lower than the operating current. This means the EC fan option features a true **soft start**. Also compared to AC fan supplied by the frequency converter, the advantages are evident and the input power is clearly inferior: from 13 to 38% as a function of the working point.

The internal electronics of the EC fan are integrated into Emerson Network Power' controls.

The EC fan design allows a new approach in regulating environmental parameters within HPAC applications. To name a few:

- constant air volume
- constant external static pressure
- sound emission optimisation
- power input optimisation
- cooling capacity regulation (on request)

This enables each system to be optimized for the installation.

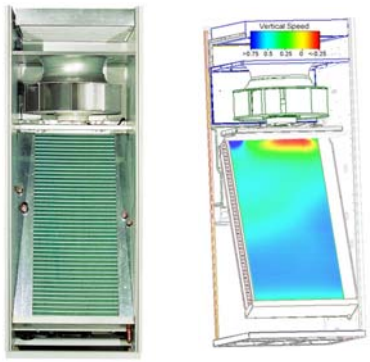
These features are available from standard Liebert Hiross HPM units supplied with the EC fan option and we can summarized that with two words: versatility and efficiency.

Heat Exchanger Section: Net Sensible Capacity matters

Efficiency is a fundamental requirement in all applications today. Even more so for technological applications where the operational costs are by far the most significant consideration. Sensible Heat Ratio (SHR) values of greater than 0.90 are required to reduce to a minimum the energy spent controlling humidity during normal operating conditions.

Heat exchanger design and a correct air distribution within the unit are two of the most important factors required to achieve optimum performance.

Liebert Hiross HPM units feature a very high coil heat exchanger surface respect the exchanged power. Using the index [frontal Surface x Rows / refrigeration Power] values of over 100 mm2/W are obtained.



Study of the components of the vector velocity through the coil: vertical speed

Sophisticated design and development tools, such as Particle Image Velocimetry and Computational Fluid Dynamics are used by Emerson Network Power to identify the best components layout in order to achieve an even and pressure—equalised airflow distribution within the unit which optimises the entire coil surface area in the heat exchanging process.

Easy maintenance

All components are easly accessible from the front of the room unit. The service compartment facilitates checking and setting of refrigeration circuit, without changing aeraulic conditions.
The access to the compressor is possible even when the unit is operating by removing the front panel. The access to the fan is executed with the greatest care for easier interventions (maintenance and/or fan replacement).

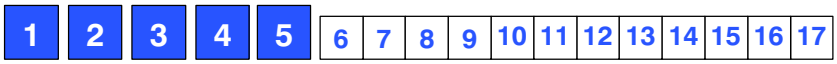
One very important feature, for example, is the possibility to check the total pressure drop of the high pressure piping using the schrader connections available in the front part of the machine(see below).

Liebert Hiross HPM front view

2 Model Configuration

Digit Nomenclature

The unit is fully defined by seventeen digits.



S 04 U A

Digit 1
range
S Small
M Medium
L Large

Digit 2 and 3
Size:
Cooling Capacity
"kW" (approx)

Digit 4
Air distribution
U Downflow
O Upflow
D Displacement
G Frontal Upflow
Other Configurations
K Constant (Upflow)
L Constant (Top Frontal Flow)

Digit 5
Version
A Air Cooled
W Water Cooled
F Freecooling
D Dualfluid Air Cooled
H Dualfluid Water Cooled

Digit 6 – Fan
0 Standard fan
1 EC fan

Digit 7 – Main Power Supply
0 400 V/3 Ph/50 Hz
1 230 V/3 Ph/50 Hz
2 230 V/1 Ph/50 Hz

Digit 8 – Electric heating
0 None
1 Electric heating

Digit 9 – Humidification
0 None
V Electrode humidifier

Digit 10 –Microprocessor Control
2 ICOM & Inner Display with Temperature Control
3 ICOM & Inner Display with Temperature and Humidity Control
A ICOM & Coldfire Display Small with Temperature Control
B ICOM & Coldfire Display Small with Temperature and Humidity Control
C ICOM & Coldfire Display Large with Temperature Control
D ICOM & Coldfire Display Large with Temperature and Humidity Control

Digit 11 –Reheating System
0 None
G Hot gas coil
W Hot water coil

Digit 12 –Air Filter Efficiency
0 G4
1 F5
2 G4; with Clogged Filter Pressure Switch
3 F5; with Clogged Filter Pressure Switch

Digit 13 –Refrigerant
0 R407C
1 R22

Digit 14 –Paint
0 RAL 7035 Color
1 CHARCOAL GREY Color

Digit 15 –On board MCB, for Remote Air Condenser
0 No MCB
1 MCB 6 A single circuit condenser
2 MCB 10 A single circuit condenser

Digit 16 –Packing
P PLP and Pallet
C Cardboard and Wooden Crate
S Seaworthy

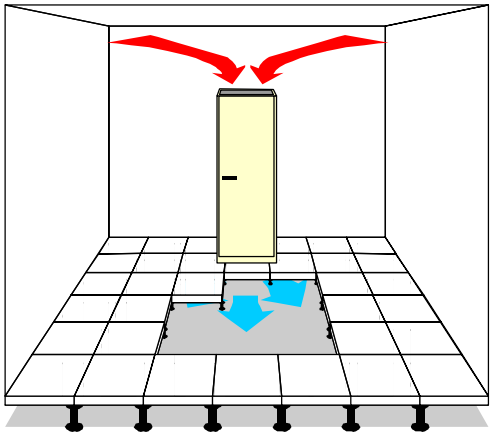
Digit 17 –Special Requirements
0 Standard Emerson Network Power
X Special Emerson Network Power

Model Configuration

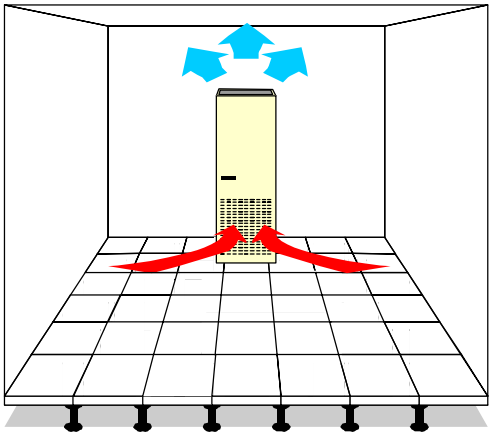
Air Distribution (4° Digit)

All units are available in the four configurations shown below.

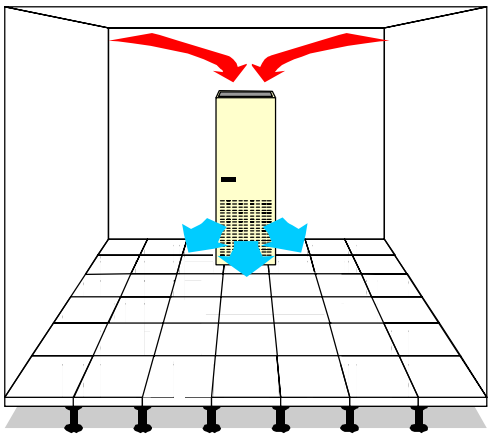
U / UNDER
Downflow



O / OVER
K / CONSTANT
Upflow with front air return

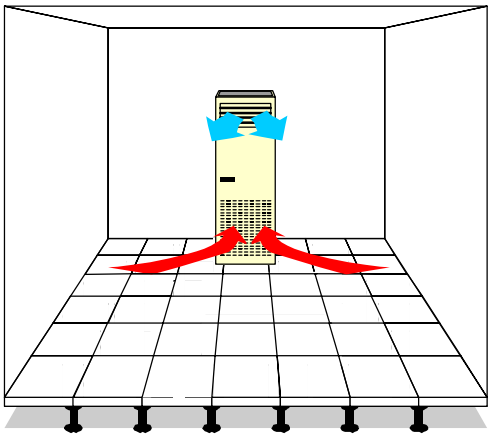


D / DISPLACEMENT
Frontal air discharge at floor level



see page 2–12

G / GRILLE
L / CONSTANT
Frontal upflow with front air return



S04–05 models

Versions (5° Digit)

Version A

Direct expansion units with air–cooled condenser

Refrigeration circuit

All models are provided with a single refrigeration circuit, M and L ranges present also double circuit units. The compressor (1) pumps the hot gaseous refrigerant into an outdoor air–cooled condenser (2). The liquefied refrigerant arrives to a liquid receiver (3) that ensures a constant and even refrigerant flow to the thermostatic expansion valve (4) and then arrives to the evaporator (5). Here the refrigerant, thanks to the heat – exchanged with the room air moved by the fan (6) – evaporates and returns to the compressor (1); from this, the refrigerant begins a new refrigeration cycle. To maintain the correct refrigerant discharge pressure, the speed of the motor fan (8) is controlled (on–off or proportional mode).

Shut–off valves are provided as standard to assist with routine maintenance.
The compressor (1) has a built–in non–return valve to avoid return of liquid refrigerant from the condenser in summertime, thus protecting the compressor from undesired refrigerant slugging during the start up. A second non–return valve (7) is recommended to avoid – in wintertime – refrigerant migration from the liquid pipes and the receiver (3) to the condenser (2), that should be responsible of low pressure intervention at the start–up of compressor.

For safety reason, a relief valve (9) is installed on the liquid receiver (3); this valve is equipped with flanged connections so that the refrigerant may be discharged to the outside.

External air–cooled condenser (2)

The units may be connected with a wide range of our condensers in standard or low noise version. For technical data and performance, refer to the relevant technical documentation. Chap. 5 gives the recommended matching condenser for Liebert Hiross HPM units as a function of outdoor air temperature.

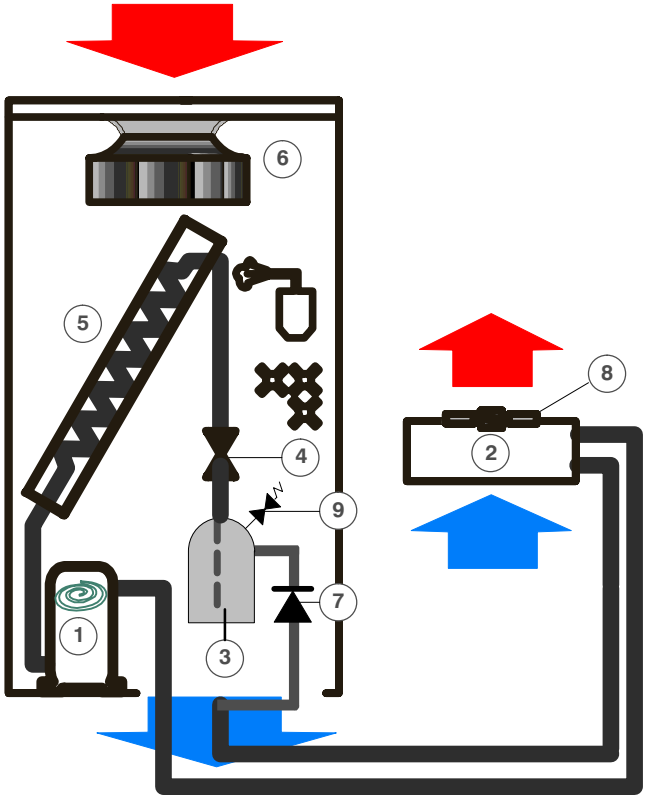
Note 1. *Units and external condensers are supplied separately.*

Note 2. *The room unit refrigeration circuit is pressurised with helium at 3 bar and the condenser refrigeration circuit at 2 bar with dry air.*

Note 3. *The customer is responsible for making connections between the Unit and the external condenser and for charging with refrigerant (standard R407C) and oil, when request.*

Full instructions for these operations are given in the Service Manual.

SxxUA
MxxUA
LxxUA
Units



Version W

Direct expansion units with water−cooled condenser

Refrigeration circuit

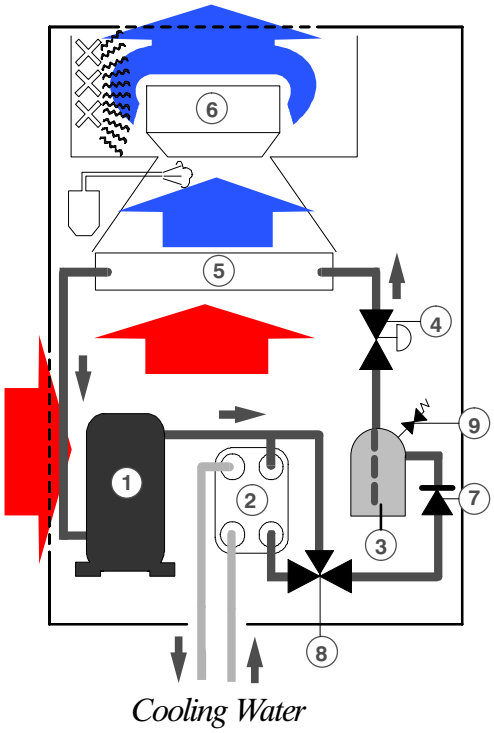
All models are provided with a single refrigeration circuit, M and L ranges present also double circuit units. The compressor (1) pumps the hot gaseous refrigerant into a water−cooled condenser (2). The liquefied refrigerant arrives to a liquid receiver (3) that ensures a constant and even refrigerant flow to the thermostatic expansion valve (4) and then arrives to the evaporator (5). Here the refrigerant, thanks to the heat − exchanged with the room air moved by the fan (6) − evaporates and returns to the compressor (1); from this, the refrigerant begins a new refrigeration cycle.
Shut−off valves are provided as standard to assist with routine maintenance.
The compressor (1) has a built−in non−return valve to avoid return of liquid refrigerant from the condenser, thus protecting the compressor from undesirable refrigerant slugging during the start up. A second non−return valve (7) is recommended to avoid refrigerant migration from the liquid pipes and the receiver (3) to the condenser (2), that should be responsible of high pressure intervention at the start−up of compressor.
For safety reason, a relief valve (9) is installed on the liquid receiver (3); this valve is equipped with flanged connections so that the refrigerant may be discharged to the outside.

Water−cooled condenser

These units are provided with one very efficient stainless steel brazed−plate water−cooled condenser (2). The condenser is fitted with an head−pressure regulating valve (8) for the automatic control of condensing pressure.
The units operate with **mains water** or **closed circuit with an external Dry Cooler**. When operating in a closed circuit, to avoid undesired ice formation in wintertime, it is advisable to use water/glycol mixture: refer to Chap. 5 for the percentages to be used at minimum ambient temperatures. Dry Coolers are available as an option; water−glycol mixture and circulation pump(s) are normally supplied by others.
If mains water is used, a mechanical filter must be fitted in the water circuit to protect the plate condenser (2) (for other information see the Service Manual).
To reduce water and energy consumption (pump), it's advisable to adopt a cooling water control valve (by the user), able to stop water feeding when unit is off.
Unit microprocessor control gives a 24V contact (10VA max, please refer to the relevant Wiring Diagram, 58 and G terminals) to drive that valve.

Note. *The water−cooled Liebert Hiross HPM versions are filled with the complete charge of the requested refrigerant (standard R407C).*

SxxOW
MxxOW
Units



Version F

Freecooler units

Freecooling mode

The Freecooler unit cools the air flow by means of the air refrigerant coil (5) in direct expansion rows [direct expansion mode] or, as an alternative, the air/water coil (5) in freecooling rows [freecooling mode]. Whenever the outdoor temperature is at least 5 degrees below the indoor return temperature, the water flow is cooled by an external Dry Cooler (10) and passes through the coil (5). When the external temperature is higher than ZET (Zero Energy Temperature), the water exchanges heat with the refrigerant in the water−cooled plate condenser (2). When the external temperature is below ZET, the water is cooled as much as to cool the room air directly in the air/water coil (5, freecooling rows).

Refrigeration circuit

All models are provided with a single refrigeration circuit, M and L ranges present also double circuit units. The compressor pumps the hot gaseous refrigerant into a water−cooled condenser (2). The liquefied refrigerant arrives to a liquid receiver (3) that ensures a constant and even refrigerant flow to the thermostatic expansion valve (4) and then arrives to the direct expansion rows of the evaporator (5). Here the refrigerant, thanks to the heat − exchanged with the room air moved by the fan (6) − evaporates and returns to the compressor (1); from this, the refrigerant begins a new refrigeration cycle.

Shut−off valves are provided as standard to assist with routine maintenance.

The compressor (1) has a built−in non−return valve to avoid return of liquid refrigerant from the condenser, thus protecting the compressor from undesired refrigerant slugging during the start up. A second non−return valve (7) is recommended to avoid refrigerant migration from the liquid pipes and the receiver (3) to the condenser (2), that should be responsible of high pressure intervention at the start−up of compressor.
For safety reason, a relief valve (9) is installed on the liquid receiver (3); this valve is equipped with flanged connections so that the refrigerant may be discharged to the outside.

Note. *The Liebert Hiross HPM Freecoolers are filled with the complete charge of the requested refrigerant (standard R407C).*

Water−cooled condenser

These units are provided with one very efficient stainless steel brazed−plate water−cooled condenser (2). The condenser is fitted with an head−pressure regulating valve (8) for the automatic control of condensing pressure.
To reduce water and energy consumption (pump), it's advisable to adopt a cooling water control valve (by the user), able to stop water feeding when unit is off.
Unit microprocessor control gives a 24V contact (10VA max, please refer to the relevant Wiring Diagram, 58 and G terminals) to drive that valve.

Water/glycol circuit

The units operate with **water in closed circuit with an external Dry Cooler** (10), cooled by the outside ambient air. To avoid undesired ice formation in wintertime, it is advisable to use water/glycol mixture: refer to the Service Manual for the percentages to be used at minimum ambient temperatures. The circulation of the water−glycol mixture is forced (the pump (11) and the water−glycol mixture are not supplied).

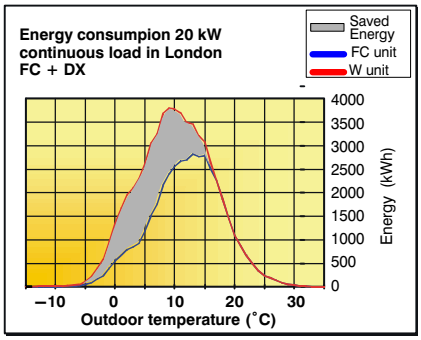
The unit is provided with 2−way modulating valve (12) to control the glycoled−water flow passing through the water/glycol coil. A solenoid valve (13) allows the water flow to the condenser.
The opening or closing signals, generated by the electronic controller, manage the valve actuator movement in order to maintain the desiderd conditions in the conditioned room.

Model Configuration

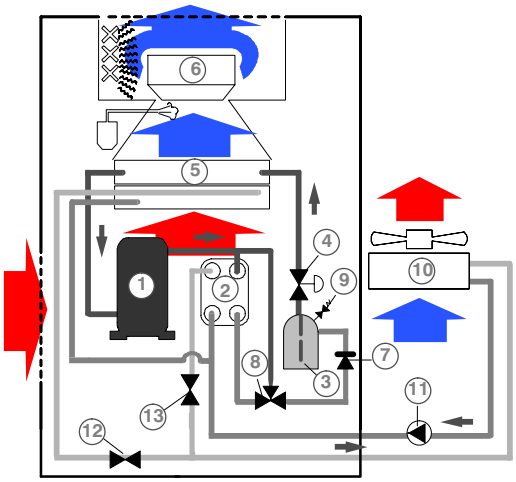
Contemporary DX and FC operation

In Liebert Hiross HPM S and M units it is implemented the contemporary operation of DX (direct expansion mode) and FC (freecooling mode). In this way the air, before passing through the evaporating coil, is precooled in the the freecooling coil. Thanks to this feature the energy saving is considerably increased, during temperate seasons, exploiting the outdoor temperature that is a little bit inferior to indoor one. Furthermore the total cooling capacity is increased and can satisfy peak cooling requests.

Liebert Hiross HPM: Annual Energy Consumption F unit vs W unit. This diagram is referred to 365 days and 24 hours running time. The saved Energy in one year is equivalent to [61323 – 42328] = 18995 kWh



SxxOF
MxxOF
Units



Version D

Air–cooled condenser dualfluid units

Dualfluid modes

The Dualfluid unit cools the air flow by means of the air refrigerant coil (5) in direct expansion rows [direct expansion mode: see refrigeration circuit] or, as an alternative, the air/water coil (5) in the chilled water rows [chilled water mode].

Refrigeration circuit

All models are provided with a single refrigeration circuit, M and L ranges present also double circuit units. The compressor (1) pumps the hot gaseous refrigerant into an outdoor air–cooled condenser (2). The liquefied refrigerant arrives to a liquid receiver (3) that ensures a constant and even refrigerant flow to the thermostatic expansion valve (4) and then arrives to the evaporator (5). Here the refrigerant, thanks to the heat – exchanged with the room air moved by the fan (6) – evaporates and returns to the compressor (1); from this, the refrigerant begins a new refrigeration cycle. To maintain the correct refrigerant discharge pressure, the speed of the motor fan (8) is controlled (on–off or proportional mode).
Shut–off valves are provided as standard to assist with routine maintenance.
The compressor (1) has a built–in non–return valve to avoid return of liquid refrigerant from the condenser in summertime, thus protecting the compressor from undesired refrigerant slugging during the start up. A second non–return valve (7) is recommended to avoid – in wintertime – refrigerant migration from the liquid pipes and the receiver (3) to the condenser (2), that should be responsible of low pressure intervention at the start–up of compressor.
For safety reason, a relief valve (9) is installed on the liquid receiver (3); this valve is equipped with flanged connections so that the refrigerant may be discharged to the outside.

External air–cooled condenser (2)

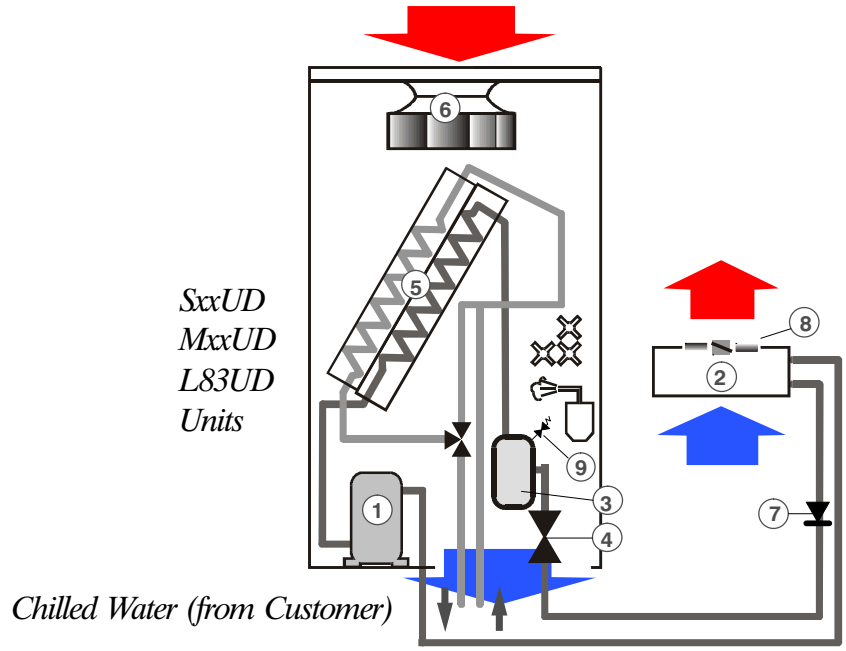
The units may be connected with a wide range of our condensers in standard or low noise version. For technical data and performance, refer to the relevant technical documentation. Chap. 5 gives the recommended matching condenser for Liebert Hiross HPM units as a function of outdoor air temperature.

Note 1. *Units and external condensers are supplied separately.*

Note 2. *The room unit refrigeration circuit is pressurised with helium at 3 bar and the condenser refrigeration circuit at 2 bar with dry air.*

Note 3. *The customer is responsible for making connections between the Unit and the external condenser and for charging with refrigerant (standard R407C).*

Full instructions for these operations are given in the Service Manual.



Version H

Water−cooled condenser dualfluid units

Dualfluid mode

The Dualfluid unit cools the air flow by means of the air−refrigerant coil (5) in direct expansion rows [direct expansion mode: see refrigeration circuit] or, as an alternative, the air/water coil (5) in the chilled water rows [chilled water mode].

Refrigeration circuit

All models are provided with a single refrigeration circuit, M and L ranges present also double circuit units. The compressor (1) pumps the hot gaseous refrigerant into a water−cooled condenser (2). The liquefied refrigerant arrives to a liquid receiver (3) that ensures a constant and even refrigerant flow to the thermostatic expansion valve (4) and then arrives to the evaporator (5). Here the refrigerant, thanks to the heat − exchanged with the room air moved by the fan (6) − evaporates and returns to the compressor (1); from this, the refrigerant begins a new refrigeration cycle.
Shut−off valves are provided as standard to assist with routine maintenance.
The compressor (1) has a built−in non−return valve to avoid return of liquid refrigerant from the condenser, thus protecting the compressor from undesirable refrigerant slugging during the start up. The second non−return valve (7) avoids refrigerant migration from the liquid pipes and the receiver (3) to the condenser (2), that should be responsible of high pressure intervention at the start−up of compressor.
For safety reason, a relief valve (9) is installed on the liquid receiver (3); this valve is equipped with flanged connections so that the refrigerant may be discharged to the outside.

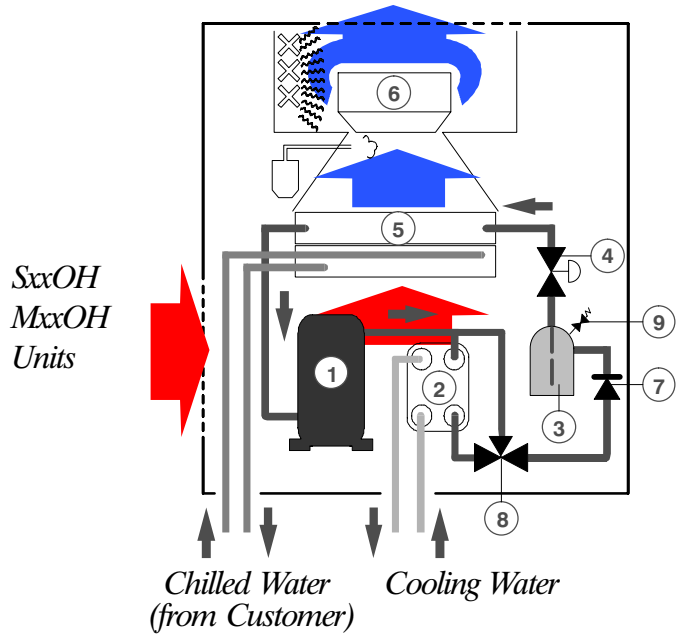
Water−cooled condenser

These units are provided with one very efficient stainless steel brazed−plate water−cooled condenser (2). The condenser is fitted with an head−pressure regulating valve (8) for the automatic control of condensing pressure.
The units operate with **mains water or open cooling tower water**.
If mains water or open tower water are used, a mechanical filter must be fitted in the water circuit to protect the condenser (for other information see the Service Manual).

To reduce water and energy consumption (pump), it's advisable to adopt a cooling water control valve (by the user), able to stop water feeding when unit is off.
Unit microprocessor control gives a 24V contact (10VA max, please refer to the relevant Wiring Diagram, 58 and G terminals) to drive that valve.

Note 1. *The water−cooled Dualfluid versions are filled with the complete charge of the requested refrigerant (standard R407C).*

Note 2. *To complete the Dualfluid system it is necessary to connect the chilled water coming from the external source to the air/water coil connections (5).*

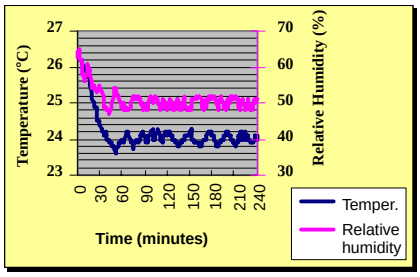


Other Configurations (4° Digit)

CONSTANT

Liebert Hiross HPM Constant is the solution for systems requiring extremely precise control of temperature and humidy for the most demanding installations and stringent standards. Typical installations are metrological rooms, laboratories, textile, pharmeceutical, tobacco, paper and precision mechanical industries.

Liebert Hiross HPM Constant, with ducted air delivery, allows temperature and humidity tolerances of ± 0.3°C and ± 2% R.H. respectively.
This important result is achieved through an accurate and continuous variation of both cooling capacity and steam production.
A special hot gas coil and a modulating valve enable the reduction of the cooling capacity from 100% to 0%.
The refrigeration diagram, the relevant description and the operating mode diagrams of the iCom Medium (or iCom CDL control, option) describe very well how the Constant room units guarantee temperature and humidity within the requested tolerances.



Model Configuration

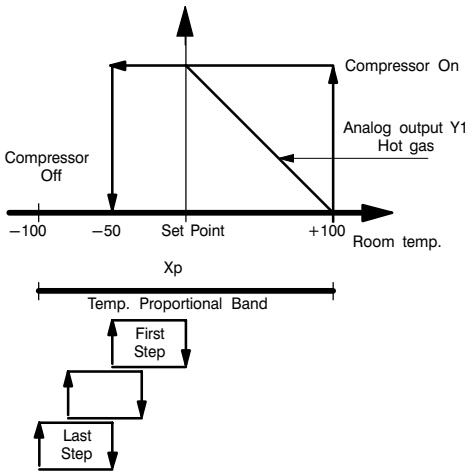
iCom Medium or iCom CDL (opt.) for Constant units

The control of the unit for Metric Rooms is performed through the control iCom Medium (or iCom CDL opt.) with relevant software (see T/H diagrams).

(T) Temperature control:

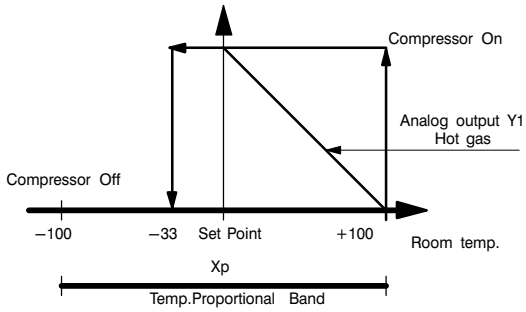
(Compressor + one, two or three electrical heating steps)

The compressor stops at −50% of proportional band. In the left side of the proportional band the electrical heating steps switch on to reach the set point temperature.



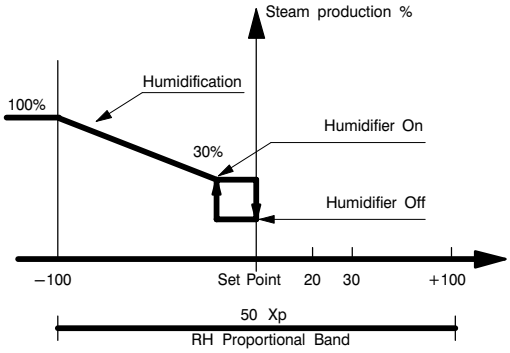
(T) Temperature control:

(Only compressor)



(H) Humidity control:

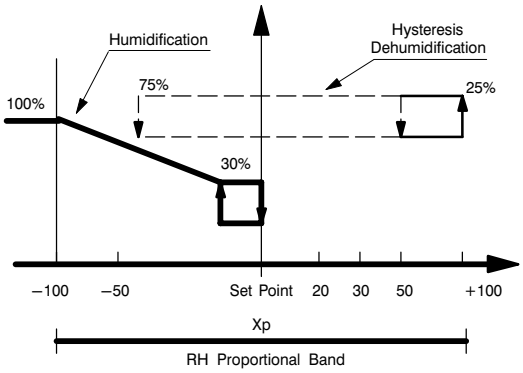
(Only humidification)



(H & D) Control mode:

(Humidification−dehumidification)

The dehumidification hysteresis can be modified form 25 to 75% of the whole humidity proportional band. If a value higher than 45% of dehumidification hysteresis is programmed the overlapping of humidification−dehumidification mode will occur.



Constant K/L, Version A

Refrigeration circuit

All models are provided with a single refrigeration circuit. The compressor (1) pumps the hot gaseous refrigerant into an outdoor air−cooled condenser (2). The liquefied refrigerant arrives to a liquid receiver (3) that ensures a constant and even refrigerant flow to the thermostatic expansion valve (4) and then arrives to the evaporator (5). Here the refrigerant, thanks to the heat − exchanged with the room air moved by the fan (6) − evaporates and returns to the compressor (1); from this, the refrigerant begins a new refrigeration cycle. To maintain the correct refrigerant discharge pressure, the speed of the motor fan (8) is controlled (on−off or proportional mode).
When the cooling capacity of the room unit is higher than the room load and the room temperature tends to decrease, the hot gas valve (11) opens and the hot gas coil (10) heats the treated air, maintaining the room at the requested restricted temperature conditions.

Shut−off valves are provided as standard to assist with routine maintenance.

The compressor (1) has a built−in non−return valve to avoid return of liquid refrigerant from the condenser in summertime, thus protecting the compressor from undesired refrigerant slugging during the start up. A second non−return valve (7) is recommended to avoid − in wintertime − refrigerant migration from the liquid pipes and the receiver (3) to the condenser (2), that should be responsible of low pressure intervention at the start−up of compressor.
For safety reason, a relief valve (9) is installed on the liquid receiver (3); this valve is equipped with flanged connections so that the refrigerant may be discharged to the outside.

External air−cooled condenser (2)

The units may be connected with a wide range of our condensers in standard or low noise version. For technical data and performance, refer to the relevant technical documentation Chap 5 gives the recommended matching condenser for Liebert Hiross HPM units as a function of outdoor air temperature.

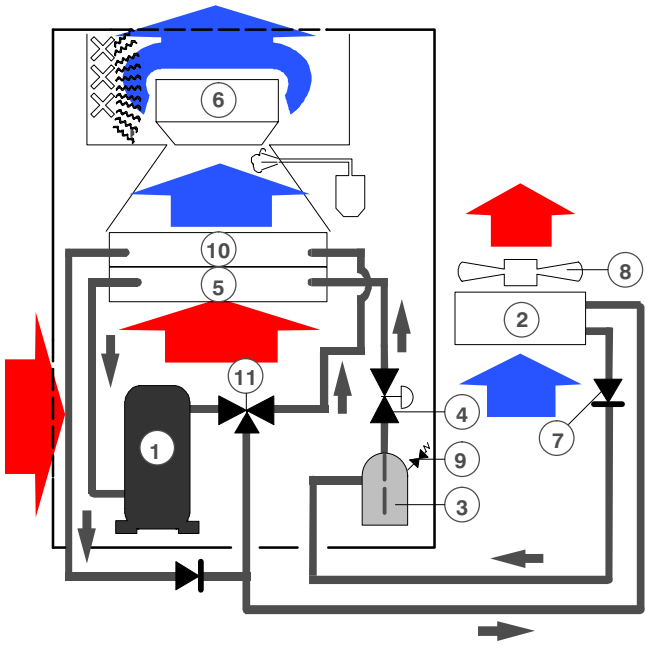
Note 1. *Units and external condensers are supplied separately.*

Note 2. *The room unit refrigeration circuit is pressurised with helium at 3 bar and the condenser refrigeration circuit at 2 bar with dry air.*

Note 3. *The customer is responsible for making connections between the Unit and the external condenser and for charging with refrigerant (standard R407C).*

Full instructions for these operations are given in the Service Manual.

SxxKA
MxxKA
Units



Constant K/L, Version W

Refrigeration circuit

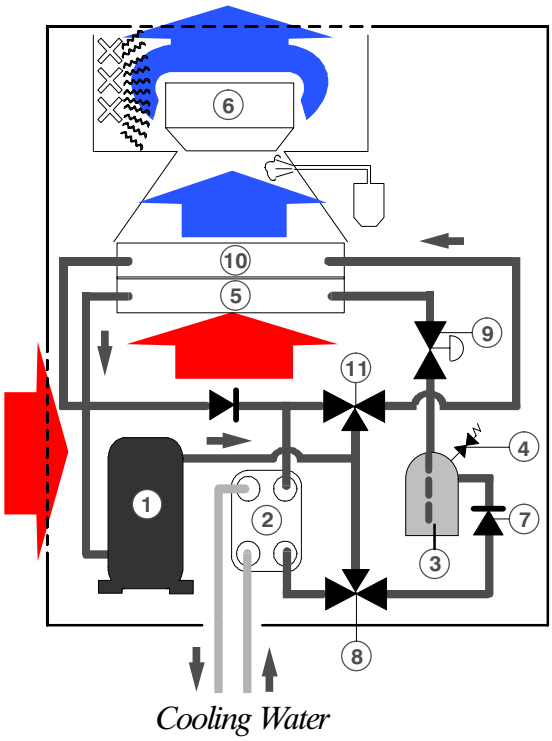
All models are provided with a single refrigeration circuit. The compressor (1) pumps the hot gaseous refrigerant into a water−cooled condenser (2). The liquefied refrigerant arrives to a liquid receiver (3) that ensures a constant and even refrigerant flow to the thermostatic expansion valve (4) and then arrives to the evaporator (5). Here the refrigerant, thanks to the heat − exchanged with the room air moved by the fan (6) − evaporates and returns to the compressor (1); from this, the refrigerant begins a new refrigeration cycle.
When the cooling capacity of the room unit is higher than the room load and the room temperature tends to decrease, the hot gas valve (11) opens and the hot gas coil (10) heats the treated air, maintaining the room at the requested restricted temperature conditions.
Shut−off valves are provided as standard to assist with routine maintenance.
The compressor (1) has a built−in non−return valve to avoid return of liquid refrigerant from the condenser, thus protecting the compressor from undesirable refrigerant slugging during the start up. The second non−return valve (7) avoids refrigerant migration from the liquid pipes and the receiver (3) to the condenser (2), that should be responsible of high pressure intervention at the start−up of compressor.
For safety reason, a relief valve (9) is installed on the liquid receiver (3); this valve is equipped with flanged connections so that the refrigerant may be discharged to the outside.

Water−cooled condenser

These units are provided with one very efficient stainless steel brazed−plate water−cooled condenser (2). The condenser is fitted with an head−pressure regulating valve (8) for the automatic control of condensing pressure.
The units operate with **mains water** or **closed circuit with an external Dry Cooler**. When operating in a closed circuit, to avoid undesired ice formation in wintertime, it is advisable to use water/glycol mixture: refer to the Service Manual for the percentages to be used at minimum ambient temperatures. Dry Coolers are available as an option; water−glycol mixture and circulation pump(s) are normally supplied by others.
If mains water is used, a mechanical filter must be fitted in the water circuit to protect the plate condenser (2) (for other information see the Service Manual).

Note. *The water−cooled versions are filled with the complete charge of the requested refrigerant (standard R407C).*

SxxKW
MxxKW
Units



Displacement D

Top air inlet, Front air discharge

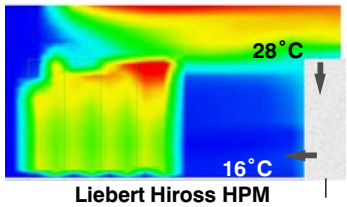
The Packaged Indoor Liebert Hiross HPM Displacement units, inject air next to the floor at low speed and take it in again from above, in the room upper part. The injected air generates a fresh air front hitting and moving the existing room air. The heat sources, on their turn, originate hot air ascensional currents to the room upper part due to natural convection. The hot air, limited and stratified above, is then taken in again by the conditioner.

The air diffusion limits the mixing between injected air mass and existing air, causing a useful temperature stratification in the room.
The Displacement system is suitable for industrial rooms and for telecom unmanned sites with very high specific load [kW/m^2].

The main advantages are:

- a better efficiency (more than 10%) of the cooling process 1, acting on air with temperature higher than the room average value;
- better efficiency of the ventilation process, needing lower exit speeds;
- lower installation costs: the false floor is not request as per Under units.
- lower operating costs: due to better efficiencies.

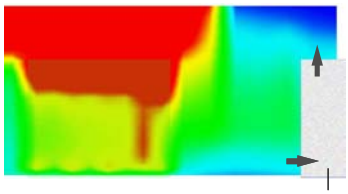
Note. *Emerson Network Power has a Flovent simulation program (arrangeable on Customer request)*



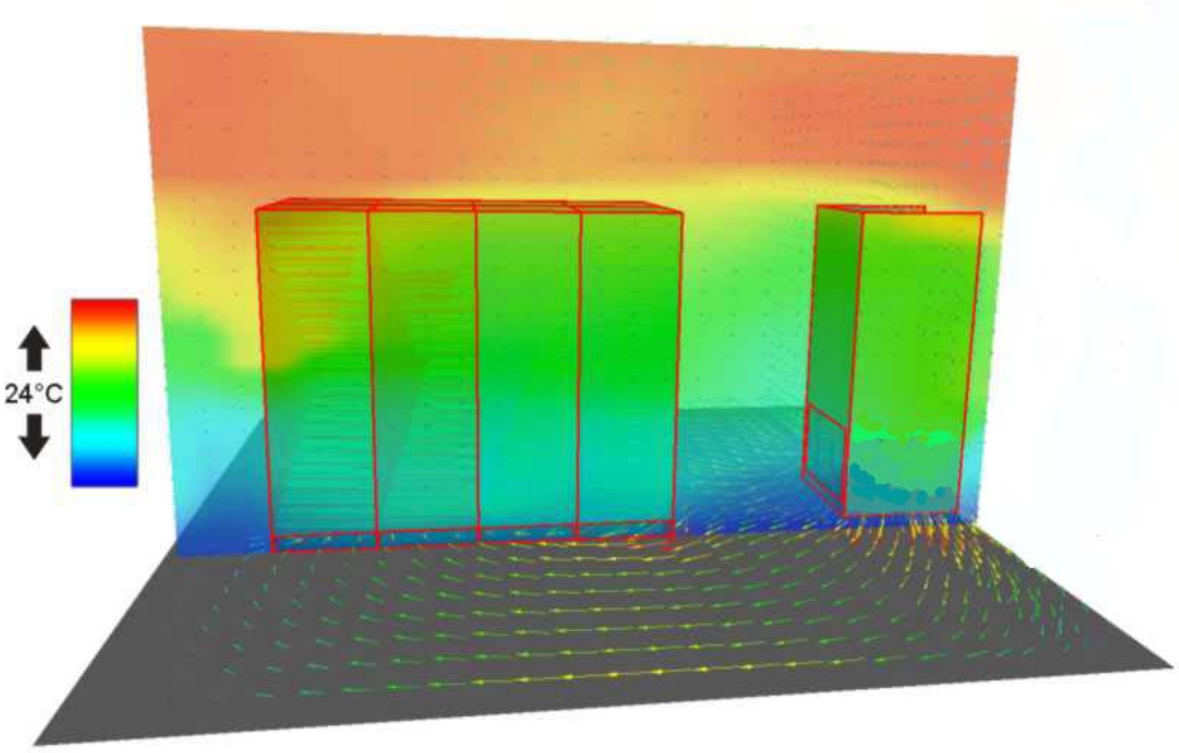
Liebert Hiross HPM Displacement

Test simulation at Emerson Network Power facilities with CFD calculation code "Flovent" FLOMERICS^{tm}

Room with 16 kW heat load. Air temperature distribution of Displacemetn configuration (top) versus Upflow configuration.



Liebert Hiross HPM Over



3 Operating Range

Liebert Hiross HPM units are provided for operating within the following working ranges (the limits concern new units on which correct installation have already been made):

All versions

Room air conditions	from:	18°C, 45% R.H.
	to:	27°C, 55% R.H
Hot water circuit	inlet water temperature	max. 85°C
	water pressure	max. 8.5 bar
Storage conditions	from:	– 20°C
	to:	50°C
Power supply tolerances		V ± 10%, Hz ± 2

For A and D units

Outdoor temperature: lower limit		
Exceeding of winter lower limits will temporarily cause a compressor stop.		
down to +10˚C	from +9˚C to –20˚C	below –21˚C
standard unit	VARIEX required	Consult HPAC Technical Sales Support
Outdoor temperature: higher limit		
This limit is determined by coupled condenser model. Exceeding of this limit (or a lack of maintenance), will caused a compressor stop by HP safety thermostat. Reset to normal operation can only be carried out manually.		

Relative position room unit vs. remote condenser		
From unit to condenser max distance	up to 30 m equivalent length	from 30 to 50 m equivalent length
From unit to condenser max geodetic height (1) (2)	from 20 m to –3 m	from 30 m to –8 m
Requirements		
Pipe diameter	see Tab 12c	see Tab 12c
Oil traps on vertical line of gas refrigerant	every 6 m, max	every 6 m, max
Extra oil charge	see Service Manual	see Service Manual
Variex installation	suggested	mandatory
Condenser	design	oversized +15%
Hot gas reheat	allowed	NOT allowed
Additional non return valve on delivery line, at 2 m from compressor	not necessary	mandatory

Operating Range

For W, F and H units

Water or mixture temperature to condenser, lower limit (other information Service Manual)	min. 5°C

Chilled water circuit	
inlet water temperature	**min. 5°C**
water pressure	**max. 16 bar**
Max. differential pressures on the modulating valve (2 or 3 ways) – Max. differential pressure through the closed valve: Δp_{cv} – Max. differential pressure across the valve for modulating service: Δp_{ms}	

S models	Δp_{cv} (kPa)	Δp_{ms} (kPa)
S17xF/D/H	200	300
S20xF/D/H	200	300
S23xF/D/H	200	300

M models	Δp_{cv} (kPa)	Δp_{ms} (kPa)
M25xF/D/H	200	300
M31xF/D/H	150	150
M34xF/D/H	150	150
M35xF/D/H	150	150
M41xF/D/H	150	150
M42xF/D/H	150	150
M47xF/D/H	150	150
M50xF/D/H	150	150
M58xF/D/H	150	150

L models	Δp_{cv} (kPa)	Δp_{ms} (kPa)
L83xF/D/H	90	200

(1) Positive difference in height: condenser above conditioner
(2) Negative difference in height: condenser below conditioner
Other information in Service Manual.

4 Technical Data

Tab. 4a — Direct expansion unit
SxxU/O A/W series

MODEL		S04	S05	S07	S10	S12	S13	S17	S20	S23
Power supply voltage (V ± 10%)	V/Ph/Hz	230/1/50	230/1/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
PERFORMANCES (1)										
air flow	m^3/h	1150	1350	2100	2600	2700	4200	4950	5200	5750
ESP (Under)	Pa	20	20	20	20	20	20	20	20	20
ESP max (Under) (2)	Pa	200	170	240	130	80	280	220	400	270
ESP (Over)	Pa	50	50	50	50	50	50	50	50	50
ESP max. (Over) (2)	Pa	250	180	240	130	80	280	220	400	270
SPL (Sound Pressure Level) (3) (Under)	dB(A)	45.5	46.4	47.3	48.2	50.5	49.0	51.3	51.5	54.4
SPL (Sound Pressure Level) (3) (Over)	dB(A)	45.9	47.4	50.1	51.3	53.5	51.4	52.4	52.4	55.5
Refrigerant						**R407C**				
total cooling capacity	kW	4.6	5.7	8.2	10.6	12.5	14.5	17.3	20.5	26.6
sensible cooling capacity	kW	4.3	5.3	7.7	10.1	11.0	13.8	16.4	19.2	23.6
SHR (Sensible Heat Ratio)	–	0.93	0.93	0.94	0.95	0.88	0.95	0.95	0.94	0.89
compressor power input	kW	1.16	1.45	2.16	2.51	3.05	2.95	3.71	4.49	5.89
fan power input	kW	0.20	0.23	0.34	0.40	0.43	0.87	0.98	1.50	1.86
full power input (compressor + fan)	kW	1.40	1.70	2.50	2.90	3.50	3.80	4.70	5.99	7.80
EER (Energy Efficiency Ratio—compr. and fan)		3.29	3.35	3.28	3.66	3.57	3.82	3.68	3.42	3.41
fan power input – EC fan opt	kW	–	–.	*	*	*	0.62	0.72	0.96	1.48
EER (Energy Efficiency Ratio (EC fan opt)	kW	–	–	*	*	*	4.06	3.91	3.76	3.61
Condensing section (W models only)										
water inlet temperature: 30°C – condensation temperature: 45°C (mid point)										
condenser type						plate type exchanger in AISI 316				
water flow	l/s	0.17	0.23	0.20	0.31	0.33	0.41	0.50	0.67	0.67
water side pressure drop	kPa	7	12	8	18	8	11	16	27	27
water connections	inch	½ F	½ F	¾ F	¾ F	¾ F	¾ F	¾ F	¾ F	¾ F
Refrigerant						**R22**				
total cooling capacity	kW	4.4	5.5	8.1	10.4	12.1	14.3	16.9	20.1	25.6
sensible cooling capacity	kW	4.3	5.2	7.6	10.0	10.9	13.7	16.1	19.0	23.1
SHR (Sensible Heat Ratio)	–	0.98	0.95	0.94	0.96	0.90	0.96	0.95	0.95	0.90
compressor power input	kW	1.12	1.40	2.07	2.42	3.06	2.82	3.53	4.55	5.67
fan power input	kW	0.20	0.23	0.34	0.40	0.43	0.87	0.98	1.50	1.86
full power input (compressor + fan)	kW	1.32	1.63	2.40	2.80	3.49	3.69	4.50	6.05	7.50
EER (Energy Efficiency Ratio—compr. and fan)		3.33	3.37	3.38	3.71	3.47	3.88	3.76	3.32	3.41
fan power input – EC fan opt	kW	–	–	*	*	*	0.62	0.72	0.96	1.48
EER (Energy Efficiency Ratio (EC fan opt)	kW	–	–	*	*	*	4.16	3.98	3.65	3.58
Condensing section (W models only)										
water inlet temperature: 30°C – condensation temperature: 45°C (mid point)										
condenser type						plate type exchanger in AISI 316				
water flow	l/s	0.20	0.27	0.20	0.32	0.34	0.42	0.52	0.68	0.68
water side pressure drop	kPa	9	15	8	19	8	12	17	28	28
water connections	inch	½ F	½ F	¾ F	¾ F	¾ F	¾ F	¾ F	¾ F	¾ F
DIMENSIONS										
length	mm	750	750	750	750	750	750	750	750	750
depth	mm	400	400	500	500	500	750	750	750	750
height	mm	1950	1950	1950	1950	1950	1950	1950	1950	1950
footprint	m^2	0.30	0.30	0.38	0.38	0.38	0.56	0.56	0.56	0.56
WEIGHTS										
net	kg	160	170	195	210	215	240	250	260	270
gross (standard packing see Fig. 12j)	kg	165	175	202	217	222	250	260	270	280

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) — Condensing temperature: 45°C (mid point) — **EER** refers to the indoor unit only — Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*
***(2)** Max. external static pressure for the indicated air flow*
***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation. Ducted Over unit.*
(*) To be defined

Technical Data

MxxU/O A/W series

MODEL		M25	M29	M31	M34	M35	M41	M42	M47	M50	M58	M66
Power supply voltage (V ± 10%)	V/Ph/Hz						400/3/50					
Refrigerant circuit		single	single	single	double	single	single	double	single	double	double	double
PERFORMANCES (1)												
air flow	m^3/h	6340	7080	8850	9490	9540	11230	11370	12250	12240	12910	13470
ESP (Under)	Pa	20	20	20	20	20	20	20	20	20	20	20
ESP max (Under) (2)	Pa	360	240	420	350	340	380	380	300	300	240	170
ESP (Over)	Pa	50	50	50	50	50	50	50	50	50	50	50
ESP max. (Over) (2)	Pa	380	280	420	350	340	380	390	300	300	250	180
SPL (Sound Pressure Level) (3) (Under)	dB(A)	53.3	55.1	58.5	60.5	60.4	58.4	58.1	60.4	59.3	61.1	63.4
SPL (Sound Pressure Level) (3) (Over)	dB(A)	55.0	57.0	57.7	59.8	59.8	60.4	60.3	61.4	61.7	62.8	63.2
Refrigerant							**R407C**					
total cooling capacity	kW	26.5	29.7	31.3	36.2	37.0	45.8	42.8	53.7	54.9	60.1	70.3
sensible cooling capacity	kW	24.2	27.2	30.3	34.1	35.1	43.4	41.5	49.0	49.3	52.7	58.5
SHR (Sensible Heat Ratio)	–	0.91	0.92	0.97	0.94	0.95	0.95	0.97	0.91	0.90	0.88	0.83
compressor power input	kW	5.89	6.96	6.94	2x 3.82	7.96	10.00	2x 4.39	12.1	2x 5.9	2x 6.96	2x 7.98
fan power input	kW	1.52	1.90	1.99	2.38	2.38	2x 1.51	2x 1.51	2x 1.74	2x 1.74	2x 1.89	2x 2.09
full power input (compressor + fan)	kW	7.41	8.86	8.93	10.01	10.34	13.02	11.8	15.58	15.28	17.69	20.13
EER (Energy Efficiency Ratio– compr. and fan)		3.56	3.35	3.51	3.62	3.58	3.52	3.63	3.45	3.59	3.40	3.49
fan power input – EC fan opt	kW	1.08	1.44	2x 0.45	2x 0.65	2x 0.65	2x 0.98	2x 0.99	2x 1.40	2x 1.40	2x 1.52	2x 1.94
EER (Energy Efficiency Ratio (EC fan opt)	kW	3.80	3.54	3.99	4.05	4.00	3.83	3.98	3.60	3.76	3.55	3.55
Condensing section (W models only)												
water inlet temperature: 30°C – condensation temperature: 45°C (mid point)												
condenser type							plate type exchanger in AISI 316					
water flow	l/s	0.64	0.71	0.74	2x 0.43	0.87	1.08	2x 0.49	1.28	2x 0.66	2x 0.72	2x 0.84
water side pressure drop	kPa	18	12	13	12	13	12	12	13	19	12	12
water connections	inch	1 F	1 F	1.¼ F	2x ¾ F	1.¼ F	1.¼ F	2x ¾ F	1.¼ F	2x1.¼ F	2x1.¼ F	2x1.¼ F
Refrigerant							**R22**					
total cooling capacity	kW	25.6	28.7	30.2	34.4	35.6	43.8	41.8	51.3	52.9	58.0	67.7
sensible cooling capacity	kW	23.8	26.6	29.8	33.3	34.4	42.4	41	48.0	48.3	51.6	57.4
SHR (Sensible Heat Ratio)	–	0.93	0.93	0.99	0.97	0.97	0.97	0.98	0.94	0.91	0.89	0.85
compressor power input	kW	5.67	6.51	6.50	2x 3.74	7.47	9.27	2x 4.33	11.56	2x 5.69	2x 6.51	2x 7.48
fan power input	kW	1.52	1.90	1.99	2.38	2.38	2x 1.51	2x 1.51	2x 1.74	2x 1.74	2x 1.89	2x 2.09
full power input (compressor + fan)	kW	7.19	8.41	8.49	9.85	9.85	12.29	11.68	15.04	14.85	16.79	19.13
EER (Energy Efficiency Ratio– compr. and fan)		3.56	3.41	3.56	3.49	3.61	3.56	3.58	3.41	3.56	3.45	3.54
fan power input – EC fan opt	kW	1.08	1.44	2x 0.45	2x 0.65	2x 0.65	2x 0.98	2x 0.99	2x 1.40	2x 1.40	2x 1.52	2x 1.94
EER (Energy Efficiency Ratio (EC fan opt)	kW	3.79	3.61	4.08	3.92	4.06	3.90	3.93	3.57	3.73	3.61	3.60
Condensing section (W models only)												
water inlet temperature: 30°C – condensation temperature: 45°C (mid point)												
condenser type							plate type exchanger in AISI 316					
water flow	l/s	0.64	0.71	0.74	2x 0.43	0.87	1.08	2x 0.51	1.28	2x 0.66	2x 0.72	2x 0.84
water side pressure drop	kPa	19	12	13	12	13	12	12	13	20	12	12
water connections	inch	1 F	1 F	1.¼ F	2x ¾ F	1.¼ F	1.¼ F	2x ¾ F	1.¼ F	2x1.¼ F	2x1.¼ F	2x1.¼ F
DIMENSIONS												
length	mm	1000	1000	1750	1750	1750	1750	1750	1750	1750	1750	1750
depth	mm	850	850	850	850	850	850	850	850	850	850	850
height	mm	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
footprint	m^2	0.85	0.85	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49
WEIGHTS												
net	kg	425	430	575	590	580	600	600	620	635	650	670
gross (standard packing see Fig. 12j)	kg	435	440	585	600	590	610	610	630	645	660	680

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) – Condensing temperature: 45°C (mid point) – **EER** refers to the indoor unit only – Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*

***(2)** Max. external static pressure for the indicated air flow*

***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation. Ducted Over unit.*

(*) To be defined

Technical Data

LxxU A/W series

MODEL		L83	L99
Power supply voltage (V ± 10%)	V/Ph/Hz	400/3/50	
Refrigerant circuit		double	double
PERFORMANCES (1)			
air flow	m^3/h	20020	21100
ESP (Under)	Pa	20	20
ESP max (Under) (2)	Pa	170	90
ESP (Over)	Pa		
ESP max. (Over) (2)	Pa		
SPL (Sound Pressure Level) (3) (Under)	dB(A)	66.2	66.9
SPL (Sound Pressure Level) (3) (Over)	dB(A)		
Refrigerant		**R407C**	
total cooling capacity	kW	86.3	104.6
sensible cooling capacity	kW	79.5	89.3
SHR (Sensible Heat Ratio)	–	0.92	0.85
compressor power input	kW	2x 9.98	2x 12.12
fan power input	kW	2x 3.08	2x 3.29
full power input (compressor + fan)	kW	26.11	30.81
EER (Energy Efficiency Ratio–compr. and fan)		3.31	3.40
fan power input – EC fan opt	kW	2x 1.92	2x 2.30
EER (Energy Efficiency Ratio (EC fan opt)	kW	3.63	3.63
Condensing section (W models only)			
water inlet temperature: 30°C – condensation temperature: 45°C (mid point)			
condenser type		plate type exchanger in AISI 316	
water flow	l/s	2x 1.03	2x 1.25
water side pressure drop	kPa	11	12
water connections	inch	1.1/4	1.1/4
Refrigerant		**R22**	
total cooling capacity	kW	82.8	100.2
sensible cooling capacity	kW	77.8	87.5
SHR (Sensible Heat Ratio)	–	0.94	0.87
compressor power input	kW	2x 9.27	2x 11.57
fan power input	kW	2x 3.08	2x 3.29
full power input (compressor + fan)	kW	24.69	29.72
EER (Energy Efficiency Ratio–compr. and fan)		3.35	3.37
fan power input – EC fan opt	kW	2x 1.92	2x 2.30
EER (Energy Efficiency Ratio (EC fan opt)	kW	3.70	3.61
Condensing section (W models only)			
water inlet temperature: 30°C – condensation temperature: 45°C (mid point)			
condenser type		plate type exchanger in AISI 316	
water flow	l/s	2x 1.02	2x 1.25
water side pressure drop	kPa	11	12
water connections	inch	1.1/4	1.1/4
DIMENSIONS			
length	mm	2550	2550
depth	mm	890	890
height	mm	1950	1950
footprint	m^2	2.27	2.27
WEIGHTS			
net	kg	950	1000
gross (standard packing see Fig. 12j)	kg	965	1015

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) – Condensing temperature: 45°C (mid point) – **EER** refers to the indoor unit only – Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*
***(2)** Max. external static pressure for the indicated air flow*
***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation. Ducted Over unit.*
(*) To be defined

Technical Data

Follows Tab. 4a.

MODEL		S04	S05	S07	S10	S12	S13	S17	S20	S23
Power supply voltage (V ± 10%)	V/Ph/Hz	230/1/50	230/1/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
FAN (4)										
type		centrifugal with backward blades								
quantity	no.	1	1	1	1	1	1	1	1	1
poles	no.	4	4	4	4	4	4	4	4	4
fan FLA	A	1.5	1.5	2.6	2.6	2.6	2.8	2.8	4.8	4.8
fan FLA – EC fan opt	A	–	–	*	*	*	4.0	4.0	4.0	4.0
fan LRA – std	A	3.1	3.1	4.9	4.9	4.9	9.9	9.9	18.0	18.0
fan LRA – EC fan opt	A	–	–	*	*	*	0.1	0.1	0.1	0.1
COMPRESSOR (5)										
quantity / type	no.	1 / Scroll								
compressor OA (R407C)	A	5.33	6.77	4.19	4.76	5.78	5.15	6.29	6.55	11.08
compressor OA (R22)	A	5.10	6.59	3.95	4.55	5.76	5.77	6.93	7.25	10.72
compressor FLA	A	10.0	11.4	5.6	7.0	10.0	8.0	9.6	11.5	16.4
compressor LRA	A	35.0	47.0	40.0	46.0	50.0	55.0	66.5	73.0	95.0
EVAPORATING COIL										
quantity / configuration	no.	1 / inclined								
pipes/fins		Copper/treated alluminium								
pitch fins	mm	1.8	1.8	2.1	1.8	1.8	1.8	1.8	1.8	1.8
rows	no.	4	4	3	4	4	3	3	4	5
front surface	m^2	0.28	0.28	0.48	0.48	0.48	0.65	0.65	0.65	0.65
REFRIGERANT CONNECTIONS (6)		**Refrigerant connecting pipe diameter: see Tab. 12c, Chap. 12**								
gas connect. (pipe to be welded, o.d.)	mm	12	12	16	16	16	18	18	18	18
liquid connec. (pipe to be welded, o.d.)	mm	12	12	12	12	12	16	16	16	16

MODEL		M25	M29	M31	M34	M35	M41	M42	M47	M50	M58	M66
Power supply voltage (V ± 10%)	V/Ph/Hz	400/3/50										
FAN (4)												
type		centrifugal with backward blades										
quantity	no.	1	1	1	1	1	2	2	2	2	2	2
poles	no.	4	4	4	4	4	4	4	4	4	4	4
fan FLA	A	4.8	4.8	6.0	6.0	6.0	2x 4.8	2x 4.8	2x 4.8	2x 4.8	2x 4.8	2x 4.8
fan FLA – EC fan opt	A	4.0	4.0	2x 4.0	2x 4.0	2x 4.0	2x 4.0	2x 4.0	2x 4.0	2x 4.0	2x 4.0	2x 4.0
fan LRA – std	A	18.0	18.0	17.8	17.8	17.8	2x 18.0	2x 18.0	2x 18.0	2x 18.0	2x 18.0	2x 18.0
fan LRA – EC fan opt	A	0.1	0.1	2x 0.1	2x 0.1	2x 0.1	2x 0.1	2x 0.1	2x 0.1	2x 0.1	2x 0.1	2x 0.1
COMPRESSOR (5)												
quantity / type	no.		1/Scroll		2/Scroll		1/Scroll	2/Scroll	1/Scroll		2/Scroll	
compressor OA (R407C)	A	11.1	13.2	13.1	2x 7.5	15.1	17.6	2x 7.9	20.8	2x 11.1	2x 13.2	2x 15.1
compressor OA (R22)	A	10.7	12.6	12.6	2x 7.5	14.5	14.9	2x 7.8	20.3	2x 10.7	2x 12.6	2x 14.5
compressor FLA	A	15.0	18.5	18.5	2x 9.6	21.2	26.0	2x 10.8	30.0	2x 15.0	2x 16.9	2x 19.4
compressor LRA	A	94.0	116	116	2x 59.5	127	159	2x 70.5	198	2x 94.0	2x 130	2x 135
EVAPORATING COIL												
quantity / configuration	no.	1 / inclined										
pipes/fins		Copper/treated alluminium										
pitch fins	mm	2.1	2.1	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
rows	no.	5	5	3	4	5	5	4	4	5	5	6
front surface	m^2	0.85	0.85	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
REFRIGERANT CONNECTIONS (6)		**Refrigerant connecting pipe diameter: see Tab. 12c, Chap. 12**										
gas connect. (pipe to be welded, o.d.)	mm	18	18	18	18	18	22	18	22	18	18	18
liquid connec. (pipe to be welded, o.d.)	mm	16	16	16	16	16	18	16	18	16	16	16

(4) *Fan OA is for standard unit operating at the standard pressure drop (Under 20 Pa, Over 50 Pa).*
(5) *Condensing temperature: 45 °C (mid point).*
(6) *The refrigerant connections on the unit are closed with blind welded flanges.*
(*) To be defined

Technical Data

MODEL		L83	L99
Power supply voltage (V ± 10%)	V/Ph/Hz	400/3/50	
FAN (4)			
type		centrifugal with backward blades	
quantity	no.	2	2
poles	no.	4	4
fan FLA	A	2x 6.0	2x 6.0
fan FLA – EC fan opt	A	2x 5.0	2x 5.0
fan LRA – std	A	2x 17.8	2x 17.8
fan LRA – EC fan opt	A	2x 0.1	2x 0.1
COMPRESSOR (5)			
quantity / type	no.	2/Scroll	
compressor OA (R407C)	A	2x 17.6	2x 20.8
compressor OA (R22)	A	2x 14.9	2x 20.3
compressor FLA	A	2x 26	2x 30
compressor LRA	A	2x 159	2x 198
EVAPORATING COIL			
quantity / configuration	no.	2 / inclined	
pipes/fins		Copper/treated alluminium	
pitch fins	mm	1.8	1.8
rows	no.	4	5
front surface	m^2	2x 2.24	2x 2.24
REFRIGERANT CONNECTIONS (6)		**Refrigerant connecting pipe diameter: see Tab. 12c, Chap. 12**	
gas connect. (pipe to be welded, o.d.)	mm	28	28
liquid connec. (pipe to be welded, o.d.)	mm	22	22

(4) *Fan OA is for standard unit operating at the standard pressure drop (Under 20 Pa, Over 50 Pa).*
(5) *Condensing temperature: 45°C (mid point).*
(6) *The refrigerant connections on the unit are closed with blind welded flanges.*
(*) To be defined

Options (further information: Chap. 8)

MODEL		S04	S05	S07	S10	S12	S13	S17	S20	S23
Power supply voltage (V ± 10%)	V/Ph/Hz	230/1/50	230/1/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Electrical heating										
FLA	A	6.5	6.5	6.5	6.5	6.5	8.6	8.6	8.6	8.6
total power / steps	kW/no.	1.50/1	1.50/1	4.50/3	4.50/3	4.50/3	5.85/3	5.85/3	5.85/3	5.85/3
Humidifier										
FLA	A	6.5	6.5	4.6	4.6	4.6	9.0	9.0	9.0	9.0
nominal power	kW	1.5	1.5	3.0	3.0	3.0	5.8	5.8	5.8	5.8
Re—heating mode										
Hot gas coil										
heating capacity (at 24˚C, 50%, condensing temp. 45˚C)	kW	2.8	3.4	5.0	6.3	7.5	8.4	10.1	12.0	15.6
Hot water coil										
heating capacity (at 24˚C, 50%, water in/out 80/65˚C)	kW	2.7	3.0	5.8	6.7	7.0	10.3	11.4	12.1	13.2
Heating mode										
Hot water coil										
heating capacity (at 24˚C, 50%, water in/out 80/65˚C)	kW	2.0	2.3	4.6	5.2	5.4	7.7	8.6	8.9	9.5

MODEL		M25	M29	M31	M34	M35	M41	M42	M47	M50	M58	M66
Power supply voltage (V ± 10%)	V/Ph/Hz						400/3/50					
Electrical heating												
FLA	A	11.0	11.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
total power / steps	kW/no.	7.5/1	7.5/1	15.0/2	15.0/2	15.0/2	15.0/2	15.0/2	15.0/2	15.0/2	15.0/2	15.0/2
Humidifier												
FLA	A	9.0	9.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
nominal power	kW	5.8	5.8	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Re—heating mode												
Hot gas coil												
heating capacity (at 24˚C, 50%, condensing temp. 45˚C)	kW	15.6	17.6	18.4	10.5	21.6	26.8	12.4	31.6	16.0	17.8	20.7
Hot water coil												
heating capacity (at 24˚C, 50%, water in/out 80/65˚C)	kW	16.3	17.4	32.5	34.2	34.5	38.4	38.3	40.8	40.8	42.3	43.9
Heating mode												
Hot water coil												
heating capacity (at 24˚C, 50%, water in/out 80/65˚C)	kW	12.4	13.2	26.2	27.3	27.4	30.2	30.5	31.8	31.8	32.8	33.7

MODEL		L83	L99
Power supply voltage (V ± 10%)	V/Ph/Hz	400/3/50	
Electrical heating			
FLA	A	26.0	26.0
total power / steps	kW/no.	18.0/3	18.0/3
Humidifier			
FLA	A	13	13
nominal power	kW	9	9
Re—heating mode			
Hot gas coil			
heating capacity (at 24˚C, 50%, condensing temp. 45˚C)	kW	29.2	36.4
Hot water coil			
heating capacity (at 24˚C, 50%, water in/out 80/65˚C)	kW	32.2	33.7
Heating mode			
Hot water coil			
heating capacity (at 24˚C, 50%, water in/out 80/65˚C)	kW	25.4	26.2

Technical Data

Tab. 4b — Direct expansion unit, S—MxxD A/W series

MODEL		S04D	S05D	S07D	S10D	S12D	S13D	S17D	S20D	S23D	M25D	M29D
power supply voltage (V ±10%)	V/Ph/Hz	230/1/50						400/3/50				
PERFORMANCE (1)												
airflow	m^3/h	970	1160	1630	2280	2430	3790	4430	4490	5330	5780	6710
external static pressure ESP	Pa	0	0	0	0	0	0	0	0	0	0	0
sound pressure level (3)	dB(A)	47.2	48.3	55.0	57.5	58.2	58.5	59.3	59.5	62.8	62.0	64.0
Refrigerant							**R407C**					
total cooling capacity	kW	4.4	5.5	7.7	10.4	12.2	14.3	17.0	20.2	26.5	26.3	29.5
sensible cooling capacity	kW	3.9	4.8	6.6	9.3	10.3	13.1	15.4	17.9	22.6	23.1	26.5
SHR (sensible/total ratio)		0.89	0.87	0.86	0.89	0.84	0.92	0.91	0.89	0.85	0.88	0.90
compressor absorbed power	kW	1.16	1.45	2.17	2.51	3.05	2.95	3.71	4.50	5.89	5.89	6.96
fan absorbed power	kW	0.16	0.20	0.28	0.37	0.40	0.77	0.88	1.23	1.71	1.25	1.75
unit absorbed power (compr. & fan)	kW	1.32	1.71	2.45	2.88	3.45	3.72	4.59	5.73	7.60	7.14	8.71
EER (in/output energy) — (compr. and fan)		3.33	3.21	3.14	3.61	3.53	3.84	3.70	3.52	3.48	3.68	3.39
opt. EC fan absorbed power	kW	—	—	*	*	*	0.60	0.64	0.70	1.34	0.73	1.09
EER (input/output energy) opt. EC fan		—	—	*	*	*	4.03	3.91	3.88	3.67	3.97	3.66
Condensing section (W model only) **water inlet temperature: 30°C – condensation temperature: 45°C(mid point)**												
condenser type							plate type exchanger in AISI 316					
water flow	l/s	0.17	0.23	0.19	0.25	0.30	0.33	0.41	0.49	0.67	0.64	0.73
water side pressure drop	kPa	6	11	7	13	18	8	11	16	27	18	23
water connections	inch	½ F	½ F	¾ F	¾ F	¾ F	¾ F	¾ F	¾ F	¾ F	1 F	1 F
Refrigerant							**R22**					
total cooling capacity	kW	4.3	5.4	7.7	10.2	11.9	14.1	16.7	19.8	25.5	25.3	28.6
sensible cooling capacity	kW	3.8	4.7	6.5	9.2	10.2	13.0	15.3	17.8	22.2	22.6	25.9
SHR (sensible/total ratio)		0.88	0.87	0.84	0.90	0.86	0.92	0.92	0.89	0.87	0.89	0.91
compressor absorbed power	kW	1.12	1.40	2.07	2.43	3.06	2.82	3.53	4.54	5.67	5.67	6.51
fan absorbed power	kW	0.16	0.20	0.28	0.37	0.40	0.77	0.88	1.23	1.71	1.25	1.75
unit absorbed power (compr. & fan)	kW	1.30	1.60	2.40	2.80	3.50	3.60	4.40	5.80	7.40	6.92	8.26
EER (in/output energy) —(compr. and fan)		3.31	3.38	3.21	3.64	3.40	3.92	3.80	3.41	3.45	3.66	3.46
opt. EC fan absorbed power	kW	—	—	*	*	*	0.60	0.64	0.70	1.34	0.73	1.09
EER (input/output energy) — opt. EC fan		—	—	*	*	*	4.12	4.00	3.78	3.64	3.95	3.76
Condensing section (W model only) **Water inlet temperature: 30°C – condensation temperature: 45°C(mid point)**												
condenser type							plate type exchanger in AISI 316					
water flow	l/s	0.19	0.26	0.19	0.26	0.31	0.34	0.42	0.51	0.68	0.64	0.73
water side pressure drop	kPa	8	14	8	13	19	8	11	17	28	18	24
water connections	inch	½ F	½ F	¾ F	¾ F	¾ F	¾ F	¾ F	¾ F	¾ F	1 F	1 F
DIMENSIONS												
length	mm	750	750	750	750	750	750	750	750	750	1000	1000
depth	mm	400	400	500	500	500	750	750	750	750	850	850
height	mm	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
footprint	m^2	0.30	0.30	0.38	0.38	0.38	0.56	0.56	0.56	0.56	0.85	0.85
WEIGHTS												
net	kg	160	170	195	210	215	240	250	260	270	425	430
gross (standard packing see Fig. 12j)	kg	165	175	202	217	222	250	260	270	280	435	440

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) — Condensing temperature: 45°C (mid point) — **EER** refers to the indoor unit only — Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*
***(2)** Max. external static pressure for the indicated air flow*
***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation.*
(*) To be defined

Technical Data

Follows Tab. 4b.

MODEL		S04D	S05D	S07D	S10D	S12D	S13D	S17D	S20D	S23D	M25D	M29D
power supply voltage (V ±10%)	V/Ph/Hz	230/1/50						400/3/50				
FANS (4)												
type						centrifugal with backward blades						
quantity	no.	1	1	1	1	1	1	1	1	1	1	1
speed	RPM	650	840	800	1050	1150	980	1040	900	1090	882	1072
poles	no.	4	4	4	4	4	4	4	4	4	4	4
fan OA	A	1.47	1.42	2.32	2.30	2.33	2.56	2.64	4.48	4.52	4.57	4.63
fan FLA	A	1.50	1.50	2.60	2.60	2.60	2.80	2.80	4.80	4.80	4.80	4.80
fan LRA	A	3.10	3.10	4.90	4.90	4.90	9.90	9.90	18.0	18.0	18.0	18.0
COMPRESSOR (5)												
quantity / type							1 / Scroll					
Compressor rated power	Hp	1.4	1.9	2.5	3.25	3.34	3.34	5.0	6.0	7.8	7.8	9.0
compressor OA (R407C)	A	5.34	6.80	4.20	4.77	5.79	5.15	6.29	6.55	11.08	11.08	13.16
compressor OA (R22)	A	5.10	6.60	3.96	4.55	5.76	5.77	6.93	7.25	10.72	10.71	12.64
compressor FLA	A	10.0	11.4	5.6	7.0	10.0	8.0	9.6	11.5	16.4	16.4	18.5
compressor LRA	A	35.0	47.0	40.0	46.0	50.0	55.0	66.5	73.0	95.0	95.0	116.0
EVAPORATING COIL												
Quantity	no.	1	1	1	1	1	1	1	1	1	1	1
pipes/fins						Copper/treated alluminium						
fin pitch / rows	mm/no.	1.8/4	1.8/4	2.1/3	1.8/4	1.8/4	1.8/3	1.8/3	1.8/4	1.8/5	2.1/5	2.1/5
front surface	m^2	0.29	0.29	0.48	0.48	0.48	0.65	0.65	0.65	0.65	0.85	0.85

(4) *Fan OA is for standard unit operating at the standard pressure drop (Under 20 Pa, Over 50 Pa).*
(5) *Condensing temperature: 45˚C (mid point).*

Options (further information: Chap.8)

MODEL		S04D	S05D	S07D	S10D	S12D	S13D	S17D	S20D	S23D	M25D	M29D
power supply voltage (V ±10%)	V/Ph/Hz	230/1/50						400/3/50				
Electrical heating												
FLA	A	6.5	6.5	6.5	6.5	6.5	8.6	8.6	8.6	8.6	11.0	11.0
total power / steps	kW/no.	1.50/1	1.50/1	4.50/3	4.50/3	4.50/3	5.85/3	5.85/3	5.85/3	5.85/3	7.5/1	7.5/1
Re—heating mode												
Hot—gas coil												
heating capacity (@24˚C, 50%R.H., 45˚C condens. temp.)	kW	2.7	3.3	4.7	6.2	7.3	8.3	9.9	11.9	15.6	15.5	17.5
Hot—water coil												
heating capacity (@24˚C, 50%R.H., 45˚C condens. temperature, 80/65˚C water temp.)	kW	2.4	2.7	5.0	6.3	6.6	9.8	10.8	11.3	12.7	15.6	17.0
Heating mode												
Hot—water coil												
heating capacity (@24˚C, 50%R.H., 80/65˚C water temp.)	kW	1.8	2.0	3.8	4.8	5.0	7.1	8.0	8.0	9.0	11.7	12.8

Technical Data

Tab. 4c — Freecooling unit
SxxU/O F series

MODEL		S17	S20	S23
power supply voltage (V ±10%)	V/Ph/Hz	400/3/50	400/3/50	400/3/50
PERFORMANCE (1)				
airflow	m^3/h	4685	4940	5460
external static pressure (Under) ESP	Pa	20	20	20
max available external static pressure (Under)(2)	Pa	210	300	250
external static pressure (Over) ESP	Pa	50	50	50
max available external static pressure (Over)(2)	Pa	230	300	270
unit power input (compressor and fan)	kW	5.39	6.87	9.18
unti power input (compressor and optional EC fan)	kW	5.14	6.33	8.79
ethylene glycol	%	30	30	30
proposed drycooler		DSM 018	DSM 022	DSM 028
SPL sound pressure level (3) Under	dB(A)	51.4	52.2	54.4
SPL sound pressure level (4) Under	dB(A)	51.2	51.7	53.9
SPL sound pressure level (3) Over	dB(A)	52.9	53.4	56.1
SPL sound pressure level (4) Over	dB(A)	52.2	51.8	54.6
MECHANICAL COOLING PERFORMANCE (@ 35.0°C outdoor air temperature)				
Refrigerant			**R407C**	
total cooling capacity	kW	15.8	18.7	23.1
sensible cooling capacity	kW	15.0	17.3	20.5
SHR (sensible/total ratio)		0.95	0.93	0.89
compressors absorbed power	kW	4.43	5.41	7.34
fan absorbed power	kW	0.89	1.49	1.72
EER (Energy Efficiency Ratio — compr. and fan)		2.93	2.71	2.52
EC fans absorbed power	kW	0.71	0.95	1.36
EER (Energy Efficiency Ratio — compr. and opti. EC fan)		3.07	2.94	2.63
mixture flow	l/s	0.74	0.81	0.82
mixture condenser pressure drop	kPa	39	46	46
Unit total pressure drop	kPa	70	70	70
Refrigerant			**R22**	
total cooling capacity	kW	15.6	18.6	22.7
sensible cooling capacity	kW	14.9	17.3	20.3
SHR (sensible/total ratio)		0.96	0.93	0.89
compressor absorbed power	kW	4.40	5.38	6.94
fan absorbed power	kW	0.89	1.49	1.72
EER (Energy Efficiency Ratio — compr. and fan)		2.91	2.28	2.59
EC fans absorbed power	kW	0.71	0.95	1.35
EER (Energy Efficiency Ratio — compr. and EC fan)		3.05	2.94	2.71
mixture flow	l/s	0.74	0.81	0.82
mixture condenser pressure drop	kPa	39	46	46
Unit total pressure drop	kPa	70	70	70
FREECOOLING PERFORMANCE (@ 5.0°C outdoor air temperature)				
total cooling capacity	kW	9.5	12.0	13.4
sensible cooling capacity	kW	9.5	12.0	13.4
SHR (sensible/total ratio)		1.00	1.00	1.00
mixture flow	l/s	0.74	0.81	0.82
unit total pressure drop	kPa	70	70	70
dry—cooler pressure drop	kPa	6	10	9
DIMENSIONS				
length	mm	750	750	750
depth	mm	750	750	750
height	mm	1950	1950	1950
footprint	m^2	0.56	0.56	0.56
WEIGHTS				
net	kg	290	310	320
gross (std. packing see Fig. 12j)	kg	300	320	330

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) — **EER** refers to the indoor unit only — Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*
***(2)** Max. external static pressure for the indicated air flow*
***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation.*
***(4)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with only fan in operation.*

Technical Data

M—LxxU/O F series

MODEL		M25	M31	M34	M35	M41	M42	M47	M50	M58	L83
power supply voltage (V ±10%)	V/Ph/Hz					400/3/50					
Refrigerant circuit		single	single	double	single	single	double	single	double	double	double
PERFORMANCE (1)											
airflow	m^3/h	6340	8850	9490	9540	11230	11370	12250	12240	12910	19010
external static pressure (Under) ESP	Pa	20	20	20	20	20	20	20	20	20	20
max available external static pressure (Under) (2)	Pa	270	390	320	310	340	330	250	250	190	200
external static pressure (Over) ESP	Pa	50	50	50	50	50	50	50	50	50	–
max available external static pressure (Over) (2)	Pa	300	400	330	320	340	330	250	250	190	–
unit power input (compressor and fan)	kW	8.79	10.69	11.64	12.16	15.26	13.88	18.28	17.95	20.88	29.52
unti power input (comp. & opt EC fan)	kW	8.33	9.54	10.34	10.86	13.94	12.56	17.52	17.19	20.58	27.20
ethylene glycol	%	30	30	30	30	30	30	30	30	30	30
proposed drycooler		DSM28	DSM028	DST030	DST030	DST040	DST040	DST050	DST050	DST060	DST080
SPL sound pressure level (3) Under	dB(A)	55.0	59.6	61.1	61.2	59.1	59.0	60.9	60.8	62.9	65.7
SPL sound pressure level (4) Under	dB(A)	54.7	59.3	60.8	60.9	59.0	58.6	60.5	60.4	62.6	65.5
SPL sound pressure level (3) Over	dB(A)	56.2	58.0	60.3	60.8	61.1	61.0	62.5	62.5	63.0	–
SPL sound pressure level (4) Over	dB(A)	54.6	57.3	59.5	59.1	59.0	59.0	60.8	60.7	61.3	–
MECHANICAL COOLING PERFORMANCE (@ 35.0°C outdoor air temperature)											
Refrigerant						R407C					
total cooling capacity	kW	24.0	28.8	31.9	32.7	40.4	38.2	47.8	47.8	53.2	75.8
sensible cooling capacity	kW	22.0	28.4	30.0	31.2	38.6	36.8	43.9	43.2	46.9	68.9
SHR (sensible/total ratio)		0.92	0.99	0.94	0.95	0.96	0.96	0.92	0.90	0.88	0.91
compressors absorbed power	kW	6.94	8.42	2x 4.46	9.54	11.93	2x 5.23	14.65	2x 7.10	2x 8.37	2x 11.67
fan absorbed power	kW	1.88	2.41	2.72	2.72	2x 1.72	2x 1.73	2x 1.88	2x 1.88	2x 2.07	2x 3.09
EER (Energy Efficiency Ratio — compr. and fan)		2.72	2.66	2.74	2.67	2.63	2.75	2.60	2.66	2.55	2.34
EC fans absorbed power	kW	1.42	2x 0.63	2x 0.65	2x 0.71	2x 1.06	2x 1.07	2x 1.40	2x 1.40	2x 1.52	2x 1.93
EER (Energy Efficiency Ratio — compr. and opti. EC fan)		2.87	2.98	3.09	2.98	2.88	3.03	2.71	2.78	2.59	2.52
mixture flow	l/s	1.17	1.41	1.79	1.57	1.82	2x 0.98	1.94	2x 1.05	2x 1.09	2x 1.70
mixture condenser pressure drop	kPa	65	50	55	45	37	65	32	54	31	33
Unit total pressure drop	kPa	85	79	115	81	85	83	87	75	48	75
Refrigerant						R22					
total cooling capacity	kW	23.7	28.1	30.9	31.9	39.4	37.8	46.5	47.0	52.2	74.1
sensible cooling capacity	kW	21.8	28.0	29.5	30.8	38.0	36.5	43.2	42.8	46.3	68.2
SHR (sensible/total ratio)		0.92	1.00	0.95	0.97	0.96	0.97	0.93	0.91	0.89	0.92
compressor absorbed power	kW	6.61	7.80	2x 4.30	8.85	11.01	2x 5.11	13.82	2x 6.74	2x 7.76	2x 10.83
fan absorbed power	kW	1.88	2.41	2.72	2.72	2x 1.72	2x 1.73	2x 1.88	2x 1.88	2x 2.07	2x 3.09
EER (Energy Efficiency Ratio — compr. and fan)		2.77	2.75	2.73	2.76	2.73	2.76	2.65	2.72	2.66	2.41
EC fans absorbed power	kW	1.42	2x 0.63	2x 0.71	2x 0.71	2x 1.06	2x 1.07	2x 1.50	2x 1.50	2x 1.92	2x 1.93
EER (Energy Efficiency Ratio — compr. and EC fan)		2.93	3.10	3.08	3.11	3.00	3.06	2.76	2.85	2.70	2.90
mixture flow	l/s	1.17	1.41	1.79	1.57	1.82	2x 0.98	1.94	2x 1.05	2x 1.09	2x 2.13
mixture condenser pressure drop	kPa	65	50	55	45	37	65	32	54	31	50
Unit total pressure drop	kPa	85	79	115	81	85	83	87	75	48	60
FREECOOLING PERFORMANCE (@ 5.0°C outdoor air temperature)											
total cooling capacity	kW	19.2	24.5	28.2	27.7	33.7	34.4	37.5	38.1	40.5	68.6
sensible cooling capacity	kW	19.2	24.5	28.2	27.7	33.7	34.4	37.5	38.1	40.5	64.8
SHR (sensible/total ratio)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.94
mixture flow	l/s	1.17	1.41	1.79	1.57	1.82	1.97	1.94	2.10	2.19	3.39
unit total pressure drop	kPa	75	48	76	59	64	74	73	84	91	41
dry—cooler pressure drop	kPa	18	25	27	22	17	19	15	18	10	30
DIMENSIONS											
length	mm	1000	1750	1750	1750	1750	1750	1750	1750	1750	2550
depth	mm	850	850	850	850	850	850	850	850	850	890
height	mm	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
footprint	m^2	0.85	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	2.27
WEIGHTS											
net	kg	510	715	725	720	730	745	740	755	770	1140
gross (std. packing see Fig. 12j)	kg	520	725	735	730	740	755	750	765	780	1155

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) — **EER** refers to the indoor unit only — Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*
***(2)** Max. external static pressure for the indicated air flow*
***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation.*
***(4)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with only fan in operation.*

Technical Data

Follows Tab. 4c.

MODEL		S17	S20	S23
power supply voltage (V ±10%)	V/Ph/Hz	400/3/50	400/3/50	400/3/50
FAN (5)				
type			centrifugal with backward blades	
quantity	no.	1	1	1
speed – std / opt fan	RPM	1114 / 990	1001 / 1060	1083 / 1200
poles	no.	4	4	4
fan OA – std / opt fan	A	2,59 / 1,15	4,62 / 1,52	4,54 / 2,17
fan FLA – std / opt fan	A	2,8 / 4.0	4,8 / 4.0	4,8 / 4.0
fan LRA – std / opt fan	A	9,9 / 0.1	18 / 0.1	18 / 0.1
COMPRESSOR (6)				
quantity / type			1 / Scroll	
Compressor rated power	Hp	5,0	6,0	7,8
compressor OA (R407C)	A	6,29	6,55	11,07
compressor OA (R22)	A	6,93	7,25	10,70
compressor FLA	A	9.6	11.5	16.4
compressor LRA	A	66,5	73	95
EVAPORATING COIL				
quantity / position	no.		1 / inclined	
pipes/fins			Copper / treated alluminium	
fin pitch / rows	no.	2,1 / 4	2,1 / 5	2,1 / 5
front surface	m^2		0,56	
CHILLED WATER COIL				
quantity / position			1 / inclined	
pipes/fins			Copper / treated alluminium	
fin pitch / rows	no.	2,1 / 3	2,1 / 4	2,1 / 4
front surface	m^2		0,56	

MODEL		M25	M31	M34	M35	M41	M42	M47	M50	M58	L83
power supply voltage (V ±10%)	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
FAN (5)											
type						centrifugal with backward blades					
quantity–std / opt fan	no.	1 / 1	1 / 2	1 / 2	1 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2
speed – std / opt fan	RPM	1128/1199	930/917	1002/917	1003/989	1081/1129	1080/1129	1130/1200	1130/1200	1201/1269	1077/1079
poles	no.					4					
fan OA – std	A	4.52	5.78	5.81	5.81	2x 4.56	2x 4.56	2x 4.50	2x 4.50	2x 4.45	2x 5.85
fan OA – opt fan	A	2.27	2x 1.02	2x 1.04	2x 1.16	2x 1.73	2x 1.73	2x 2.25	2x 2.25	2x 2.47	2x 2.98
fan FLA – std / opt fan	A	4,8 / 4.0	8.7/8.0	8.7/8.0	8.7/8.0	4,8 / 4.0	4,8 / 4.0	4,8 / 4.0	4,8 / 4.0	4,8 / 4.0	2x6.0/5.0
fan LRA – std / opt fan	A	18 / 0.1	35.6/0.2	35.6/0.2	35.6/0.2	18 / 0.1	18 / 0.1	18 / 0.1	18 / 0.1	18 / 0.1	2x17.8/0.1
COMPRESSOR (6)											
quantity / type		1 / Scroll		2 / Scroll	1 / Scroll		2 / Scroll	1 / Scroll		2 / Scroll	
Compressor rated power	Hp	7.8	9	2x 4	10.0	13	2x 6.0	15.0	2x 7.8	2x 9.0	2x 13.0
compressor OA (R407C)	A	12.5	14.9	2x 8.3	17.0	20.4	2x 9.2	24.2	2x 12.7	2x 14.9	2x 20.0
compressor OA (R22)	A	11.9	14.2	2x 8.1	16.1	17.0	2x 9.0	23.3	2x 12.2	2x 14.1	2x 16.7
compressor FLA	A	16.4	18.5	2x 10.2	21.2	26.0	2x 10.8	30.0	2x 16.4	2x 18.5	2x 26.0
compressor LRA	A	95	116	2x 63	127	159	2x 71	198	2x 95	2x 116	2x 159
EVAPORATING COIL											
quantity / position	no.					1 / inclined					
pipes/fins						Copper / treated alluminium					
fin pitch / rows	no.	2.1/5	2.1/4	2.1/4	2.1/4	2.1/5	2.1/5	2.1/5	2.1/5	2.1/5	1.8/5
front surface	m^2	0.68	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	2x 2.1
CHILLED WATER COIL											
quantity / position						1 / inclined					
pipes/fins						Copper / treated alluminium					
fin pitch / rows	no.	2.1/6	2.1/5	2.1/5	2.1/5	2.1/6	2.1/6	2.1/6	2.1/6	2.1/6	1.8/5
front surface	m^2	0.68	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	2x 2.1

(5) *Fan OA is for standard unit operating at the standard pressure drop (Under 20 Pa, Over 50 Pa).*
(6) *Condensing temperature: 45 °C (mid point).*

Technical Data

Tab. 4d — Direct expansion unit Dualfluid air—cooled condenser
SxxU/O D series

MODEL		S17	S20	S23
power supply voltage (V ±10%)	V/Ph/Hz	400/3/50	400/3/50	400/3/50
PERFORMANCE (1)				
airflow	m^3/h	4680	4930	5470
external static pressure (Under) ESP	Pa	20	20	20
max available external static pressure (Under)(2)	Pa	190	300	235
external static pressure (Over) ESP	Pa	50	50	50
max available external static pressure (Over)(2)	Pa	220	300	220
unit power input	kW	4.70	6.00	7.70
unti power input – with EC fan	kW	4.42	5.52	7.33
ethylene glycol	%	0	0	0
SPL sound pressure level (3) Under	dB(A)	51.4	52.2	54.4
SPL sound pressure level (4) Under	dB(A)	51.2	51.7	53.9
SPL sound pressure level (3) Over	dB(A)	52.9	53.4	56.1
SPL sound pressure level (4) Over	dB(A)	52.2	51.8	54.6
MECHANICAL COOLING PERFORMANCE (1)				
Refrigerant			**R407C**	
total cooling capacity	kW	17.2	20.2	25.5
sensible cooling capacity	kW	15.6	18.0	21.5
SHR (sensible/total ratio)		0.91	0.89	0.84
compressor absorbed power	kW	3.71	4.50	5.88
fan absorbed power	kW	0.96	1.49	1.72
EER (Energy Efficiency Ratio — compr. and fan)		3.66	3.37	3.31
EC fans absorbed power	kW	0.71	0.95	1.35
EER (Energy Efficiency Ratio — compr. and EC fan)		3.94	3.66	3.49
Refrigerant			**R22**	
total cooling capacity	kW	16.9	19.8	24.5
sensible cooling capacity	kW	15.4	17.8	21.0
SHR (sensible/total ratio)		0.91	0.90	0.86
compressor absorbed power	kW	3.53	4.54	5.65
fan absorbed power	kW	0.96	1.49	1.72
EER (Energy Efficiency Ratio — compr. and fan)		3.76	3.30	3.27
EC fans absorbed power	kW	0.71	0.95	1.35
EER (Energy Efficiency Ratio — compr. and EC fan)		4.01	3.57	3.46
CHILLED WATER PERFORMANCE (1)				
total cooling capacity	kW	12.2	16.7	18.2
sensible cooling capacity	kW	12.2	16.2	17.7
SHR (sensible/total ratio)		1.00	0.97	0.97
water flow	l/s	0.58	0.80	0.87
unit total pressure drop	kPa	32	35	41
DIMENSIONS				
length	mm	750	750	750
depth	mm	750	750	750
height	mm	1950	1950	1950
footprint	m^2	0.56	0.56	0.56
WEIGHTS				
net	kg	290	310	320
gross (std. packing see Fig. 12j)	kg	300	320	330

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) — Condensing temperature: 45°C (mid point) — CW mode water temperature inlet/outlet 7/12 °C — **EER** refers to the indoor unit only — Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*
***(2)** Max. external static pressure for the indicated air flow*
***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation. Ducted unit.*
***(4)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with only fan in operation. Ducted unit.*

Technical Data

M—LxxU/O D series

MODEL		M25	M31	M34	M35	M41	M42	M47	M50	M58	L83
power supply voltage (V ±10%)	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Refrigerant circuit		single	single	double	single	single	double	single	double	double	double
PERFORMANCE (1)											
airflow	m^3/h	6340	8850	9490	9540	11230	11370	12250	12240	12910	19010
external static pressure (Under) ESP	Pa	20	20	20	20	20	20	20	20	20	20
max available external static pressure (Under) (2)	Pa	270	390	320	310	340	330	250	250	190	200
external static pressure (Over) ESP	Pa	50	50	50	50	50	50	50	50	50	–
max available external static pressure (Over) (2)	Pa	300	400	330	320	340	330	250	250	190	–
unit power input	kW	8.79	10.69	11.64	12.16	15.26	13.88	18.28	17.95	20.88	26.06
unti power input – with EC fan	kW	8.33	9.54	10.34	10.86	13.94	12.56	17.52	17.19	20.58	22.38
ethylene glycol	%	0	0	0	0	0	0	0	0	0	0
SPL sound pressure level (3) Under	dB(A)	55.0	59.6	61.1	61.2	59.1	59.0	60.9	60.8	62.9	65.7
SPL sound pressure level (4) Under	dB(A)	54.7	59.3	60.8	60.9	59.0	58.6	60.5	60.4	62.6	65.5
SPL sound pressure level (3) Over	dB(A)	56.2	58.0	60.3	60.8	61.1	61.0	62.5	62.5	63.0	–
SPL sound pressure level (4) Over	dB(A)	54.6	57.3	59.5	59.1	59.0	59.0	60.8	60.7	61.3	–
MECHANICAL COOLING PERFORMANCE (1)											
Refrigerant						**R407C**					
total cooling capacity	kW	25.7	31.1	34.2	35.3	43.9	41.1	51.6	51.7	57.1	81.0
sensible cooling capacity	kW	22.7	29.4	31.0	32.4	40.2	38.0	45.7	45..0	48.6	71.1
SHR (sensible/total ratio)		0.88	0.95	0.91	0.92	0.92	0.92	0.89	0.87	0.85	0.88
compressor absorbed power	kW	5.88	6.94	2x 3.82	7.98	9.98	2x 4.39	12.12	2x 5.89	2x 6.97	2x 9.94
fan absorbed power	kW	1.88	2.41	2.72	2.72	2x 1.72	2x 1.73	2x 1.88	2x 1.88	2x 2.07	2x 3.09
EER (Energy Efficiency Ratio — compr. and fan)		3.31	3.33	3.30	3.30	3.27	3.36	3.25	3.33	3.16	3.11
EC fans absorbed power	kW	1.42	2x 0.63	2x 0.65	2x 0.71	2x 1.06	2x 1.07	2x 1.40	2x 1.40	2x 1.52	2x 1.93
EER (Energy Efficiency Ratio — compr. and EC fan)		3.52	3.79	3.82	3.76	3.62	3.76	3.46	3.55	3.36	3.41
Refrigerant						**R22**					
total cooling capacity	kW	24.8	30.0	32.6	34.0	42.1	40.3	49.4	50.0	55.5	78.3
sensible cooling capacity	kW	22.3	28.8	30.3	31.8	39.3	37.6	44.6	44.1	47.8	69.9
SHR (sensible/total ratio)		0.90	0.96	0.93	0.94	0.93	0.93	0.90	0.88	0.86	0.89
compressor absorbed power	kW	5.66	6.50	2x 3.69	7.47	9.27	2x 4.32	11.57	2x 5.66	2x 6.51	2x 9.26
fan absorbed power	kW	1.88	2.41	2.72	2.72	2x 1.72	2x 1.73	2x 1.88	2x 1.88	2x 2.07	2x 3.09
EER (Energy Efficiency Ratio — compr. and fan)		3.29	3.37	3.23	3.34	3.31	3.33	3.22	3.32	3.23	3.17
EC fans absorbed power	kW	1.42	2x 0.63	2x 0.65	2x 0.71	2x 1.06	2x 1.07	2x 1.40	2x 1.40	2x 1.52	2x 1.93
EER (Energy Efficiency Ratio — compr. and EC fan)		3.50	3.87	3.76	3.82	3.70	3.73	3.43	3.54	3.46	3.50
CHILLED WATER PERFORMANCE (1)											
total cooling capacity	kW	29.3	42.5	44.8	45.0	56.3	56.8	60.1	60.1	62.5	83.7
sensible cooling capacity	kW	24.8	35.4	37.6	37.8	46.1	46.6	49.6	49.6	51.9	72.3
SHR (sensible/total ratio)		0.85	0.83	0.84	0.84	0.82	0.82	0.83	0.83	0.83	0.86
water flow	l/s	1.40	2.03	2.14	2.14	2.69	2.71	2.87	2.87	2.98	3.99
unit total pressure drop	kPa	89	80	88	89	113	115	128	128	137	46
DIMENSIONS											
length	mm	1000	1750	1750	1750	1750	1750	1750	1750	1750	2550
depth	mm	850	850	850	850	850	850	850	850	850	890
height	mm	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
footprint	m^2	0.85	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	2.27
WEIGHTS											
net	kg	500	705	715	710	715	730	725	740	745	1115
gross (std. packing see Fig. 12j)	kg	510	715	725	720	725	740	735	750	755	1130

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24˚C bs; 50% R.H. (17˚C wb) — Condensing temperature: 45˚C (mid point) — CW mode water temperature inlet/outlet 7/12 ˚C — **EER** refers to the indoor unit only — Air flow of the units refers to the standard configuration with G4 class filter.*

***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*

***(2)** Max. external static pressure for the indicated air flow*

***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation. Ducted unit.*

***(4)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with only fan in operation. Ducted unit.*

Tab. 4e — Direct expansion unit Dualfluid water—cooled condenser
SxxU/O H series

MODEL		S17	S20	S23
power supply voltage (V ±10%)	V/Ph/Hz	400/3/50	400/3/50	400/3/50
PERFORMANCE (1)				
airflow	m^3/h	4685	4940	5460
external static pressure (Under) ESP	Pa	20	20	20
max available external static pressure (Under) (2)	Pa	200	300	300
external static pressure (Over) ESP	Pa	50	50	50
max available external static pressure (Over) (2)	Pa	220	300	300
unit power input	kW	4.67	5.99	7.6
unti power input – with EC fan	kW	4.64	5.53	7.33
ethylene glycol	%	0	0	0
SPL sound pressure level (3) Under	dB(A)	51.4	52.2	54.4
SPL sound pressure level (4) Under	dB(A)	51.2	51.7	53.9
SPL sound pressure level (3) Over	dB(A)	52.9	53.4	56.1
SPL sound pressure level (4) Over	dB(A)	52.2	51.8	54.6
MECHANICAL COOLING PERFORMANCE				
Refrigerant			**R407C**	
total cooling capacity	kW	17.2	20.2	25.4
sensible cooling capacity	kW	15.6	18.0	21.5
SHR (sensible/total ratio)		0.91	0.89	0.85
compressor absorbed power	kW	3.71	4.50	5.88
std fan absorbed power	kW	0.96	1.49	1.51
EER (Energy Efficiency Ratio — compr. and std fan)		3.68	3.37	3.34
EC fans absorbed power	kW	0.71	0.95	1.35
EER (Energy Efficiency Ratio — compr. and EC fan)		3.71	3.65	3.47
water inlet temperature	°C	30	30	30
water flow	l/s	0.41	0.49	0.61
water condenser pressure drop	kPa	11	16	12
unit total pressure drop	kPa	11	16	12
Refrigerant			**R22**	
total cooling capacity	kW	16.9	19.8	24.5
sensible cooling capacity	kW	15.4	17.8	21.1
SHR (sensible/total ratio)		0.91	0.90	0.86
compressor absorbed power	kW	3.59	4.54	5.65
fan absorbed power	kW	0.96	1.49	1.73
EER (Energy Efficiency Ratio — compr. and fan)		3.76	3.28	3.24
EC fans absorbed power	kW	0.71	0.95	1.35
EER (Energy Efficiency Ratio — compr. and EC fan)		3.99	3.55	3.45
water inlet temperature	°C	30	30	30
water flow	l/s	0.42	0.51	0.62
water condenser pressure drop	kPa	12	17	12
unit total pressure drop	kPa	12	17	12
CHILLED WATER PERFORMANCE				
total cooling capacity	kW	12.2	16.7	18.2
sensible cooling capacity	kW	12.2	16.2	17.7
SHR (sensible/total ratio)		1.00	0.97	0.97
water inlet temperature	°C	7	7	7
water flow	l/s	0.58	0.80	0.87
unit total pressure drop	kPa	32	35	41
DIMENSIONS				
length	mm	750	750	750
depth	mm	750	750	750
height	mm	1950	1950	1950
footprint	m^2	0.56	0.56	0.56
WEIGHTS				
net	kg	290	310	320
Gross (std. packing see Fig. 12j)	kg	300	320	330

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) — Condensing temperature: 45°C (mid point) — **EER** refers to the indoor unit only — Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*
***(2)** Max. external static pressure for the indicated air flow*
***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation. Ducted Over unit.*
***(4)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with only fan in operation. Ducted Over unit.*

Technical Data

M—LxxU/O H series

MODEL		M25	M31	M34	M35	M41	M42	M47	M50	M58	L83
power supply voltage (V ±10%)	V/Ph/Hz					400/3/50					
Refrigerant circuit		single	single	double	single	single	double	single	double	double	double
PERFORMANCE (1)											
airflow	m^3/h	6340	8850	9490	9540	11230	11370	12250	12240	12910	19010
external static pressure (Under) ESP	Pa	20	20	20	20	20	20	20	20	20	20
max available external static pressure (Under)(2)	Pa	270	390	320	310	340	330	250	250	190	200
external static pressure (Over) ESP	Pa	50	50	50	50	50	50	50	50	50	–
max available external static pressure (Over)(2)	Pa	300	400	330	320	340	330	250	250	190	–
unit power input	kW	8.79	10.69	11.64	12.16	15.26	13.88	18.28	17.95	20.88	26.07
unti power input – with EC fan	kW	8.33	9.54	10.34	10.86	13.94	12.56	17.52	17.19	20.58	23.76
ethylene glycol	%	0	0	0	0	0	0	0	0	0	
SPL sound pressure level (3) Under	dB(A)	55.0	59.6	61.1	61.2	59.1	59.0	60.9	60.8	62.9	65.7
SPL sound pressure level (4) Under	dB(A)	54.7	59.3	60.8	60.9	59.0	58.6	60.5	60.4	62.6	65.5
SPL sound pressure level (3) Over	dB(A)	56.2	58.0	60.3	60.8	61.1	61.0	62.5	62.5	63.0	–
SPL sound pressure level (4) Over	dB(A)	54.6	57.3	59.5	59.1	59.0	59.0	60.8	60.7	61.3	–
MECHANICAL COOLING PERFORMANCE											
Refrigerant						R407C					
total cooling capacity	kW	25.7	31.1	34.2	35.3	44.0	41.1	51.6	51.7	57.1	81.0
sensible cooling capacity	kW	22.7	29.3	31.0	32.4	40.2	38.0	45.6	44.9	48.5	71.1
SHR (sensible/total ratio)		0.88	0.94	0.91	0.92	0.91	0.92	0.85	0.87	0.85	0.88
compressor absorbed power	kW	5.88	6.94	2x 3.82	7.98	9.98	2x 4.39	12.12	2x 5.89	2x 6.97	2x 9.95
std fan absorbed power	kW	1.88	2.41	2.72	2.72	2x 1.72	2x 1.73	2x 1.88	2x 1.88	2x 2.07	2x 3.09
EER (Energy Efficiency Ratio — compr. and std fan)		3.31	3.33	3.30	3.30	3.28	3.36	3.25	3.33	3.16	3.11
EC fans absorbed power	kW	1.42	2x 0.63	2x 0.65	2x 0.71	2x 1.06	2x 1.07	2x 1.40	2x 1.40	2x 1.52	2x 1.93
EER (Energy Efficiency Ratio — compr. and EC fan)		3.52	3.79	3.82	3.76	3.64	3.76	3.46	3.55	3.36	3.41
water inlet temperature	°C	30	30	30	30	30	30	30	30	30	30
water flow	l/s	0.62	0.74	2x 0.41	0.84	1.04	2x 0.50	1.24	2x 0.62	2x 0.68	2x 0.97
water condenser pressure drop	kPa	17	13	11	12	11	16	12	18	11	10
unit total pressure drop	kPa	17	13	11	12	11	16	12	18	11	10
Refrigerant						R22					
total cooling capacity	kW	24.8	30.0	32.6	34.0	42.1	40.2	49.5	50.0	55.5	78.3
sensible cooling capacity	kW	22.3	28.8	30.3	31.8	39.2	37.6	44.6	44.1	47.7	69.9
SHR (sensible/total ratio)		0.90	0.96	0.93	0.94	0.93	0.93	0.90	0.88	0.86	0.89
compressor absorbed power	kW	5.66	6.50	2x 3.69	7.47	9.27	2x 4.32	11.57	2x 5.66	2x 6.51	2x 9.26
fan absorbed power	kW	1.88	2.41	2.72	2.72	2x 1.72	2x 1.73	2x 1.88	2x 1.88	2x 2.07	2x 3.09
EER (Energy Efficiency Ratio — compr. and fan)		3.29	3.37	3.23	3.34	3.31	3.32	3.23	3.32	3.23	3.17
EC fans absorbed power	kW	1.42	2x 0.63	2x 0.65	2x 0.71	2x 1.06	2x 1.07	2x 1.40	2x 1.40	2x 1.52	2x 1.93
EER (Energy Efficiency Ratio — compr. and EC fan)		3.50	3.87	3.76	3.82	3.70	3.73	3.44	3.54	3.46	3.50
water inlet temperature	°C	30	30	30	30	30	30	30	30	30	30
water flow	l/s	0.62	0.74	2x 0.41	0.84	1.04	2x 0.51	1.24	2x .63	2x 0.69	2x 0.97
water condenser pressure drop	kPa	17	13	11	12	11	17	12	18	11	10
unit total pressure drop	kPa	17	13	11	12	11	17	12	18	11	10
CHILLED WATER PERFORMANCE											
total cooling capacity	kW	29.3	42.5	44.8	45.0	56.3	56.8	60.1	60.1	62.5	83.7
sensible cooling capacity	kW	24.8	35.4	37.6	37.8	46.1	46.6	49.6	49.6	51.9	72.3
SHR (sensible/total ratio)		0.85	0.83	0.84	0.84	0.82	0.82	0.83	0.83	0.83	0.86
water inlet temperature	°C	7	7	7	7	7	7	7	7	7	7
water flow	l/s	1.40	2.03	2.14	2.14	2.69	2.71	2.87	2.87	2.98	3.99
unit total pressure drop	kPa	89	80	88	89	113	115	128	128	137	46
DIMENSIONS											
length	mm	1000	1750	1750	1750	1750	1750	1750	1750	1750	2550
depth	mm	850	850	850	850	850	850	850	850	850	890
height	mm	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
footprint	m^2	0.85	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	2.27
WEIGHTS											
net	kg	510	715	725	720	730	745	740	755	770	1140
Gross (std. packing see Fig. 12j)	kg	520	725	735	730	740	755	750	765	780	1155

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) — Condensing temperature: 45°C (mid point) — **EER** refers to the indoor unit only — Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*

***(2)** Max. external static pressure for the indicated air flow*

***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation. Ducted Over unit.*

***(4)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with only fan in operation. Ducted Over unit.*

Options (further information: Cap.8)

MODEL		S17	S20	S23
power supply voltage (V ±10%)	V/Ph/Hz	400/3/50	400/3/50	400/3/50
Electrical heating (opt.)				
FLA	A	8,6	8,6	8,6
total power / steps	kW/no.	5.85/3	5.85/3	5.85/3
Humidifier				
FLA	A	9.0	9.0	9.0
nominal power	kW	5.8	5.8	5.8
Re—heating mode				
Hot—gas coil – R407C				
heating capacity (@24°C, 50%R.H., 45°C condens.temp.)	kW	10,0	11,9	15,0
Hot—water coil – DX mode – R407C				
heating capacity — 45°C condens.temp. (@24°C, 50%R.H., 80/65°C water temp.)	kW	12,1	12,8	13,8
Heating mode				
Hot—water coil				
heating capacity (@24°C, 50%R.H., 80/65°C water temp.)	kW	9,1	9,4	10,0

MODEL		M25	M31	M34	M35	M41	M42	M47	M50	M58	L83
power supply voltage (V ±10%)	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Electrical heating (opt.)											
FLA	A	11.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	26.0
total power / steps	kW/no.	7.5/1	15.0/2	15.0/2	15.0/2	15.0/2	15.0/2	15.0/2	15.0/2	15.0/2	18.0/3
Humidifier											
FLA	A	9.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
nominal power	kW	5.8	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Re—heating mode											
Hot—gas coil – R407C											
heating capacity (@24°C, 50%R.H., 45°C condens.temp.)	kW	15.6	18.4	10.5	21.6	26.8	12.4	31.6	16.0	17.8	29.2
Hot—water coil – DX mode – R407C											
heating capacity — 45°C condens.temp. (@24°C, 50%R.H., 80/65°C water temp.)	kW	16.3	32.5	34.2	34.5	38.4	38.3	40.8	40.8	42.3	32.2
Heating mode											
Hot—water coil											
heating capacity (@24°C, 50%R.H., 80/65°C water temp.)	kW	12.4	26.2	27.3	27.4	30.2	30.5	31.8	31.8	32.8	25.6

Technical Data

Tab. 4f — Direct expansion unit Frontal delivery – SxxG A/W series

MODEL		S04G	S05G
power supply voltage (V ± 10%)	V/Ph/Hz	230/1/50	230/1/50
PERFORMANCE (1)			
airflow	m^3/h	1150	1350
external static pressure ESP	Pa	0	0
sound pressure level(2)	dB(A)	49.5	51.4
Refrigerant		**R407C**	
total cooling capacity	kW	4.6	5.7
sensible cooling capacity	kW	4.3	5.3
SHR (sensible/total ratio)		0.93	0.93
compressor absorbed power	kW	1.16	1.45
fan absorbed power	kW	0.20	0.23
unit absorbed power (compr. and fan)	kW	1.40	1.70
EER (Energy Efficiency Ratio —. compr. and fan)		3.29	3.35
Condensing section (W model only) **water inlet temperature: 30°C – condensation temperature: 45°C(mid point)**			
condenser type		plate heat exchanger AISI 316	
quantity	no.	1	1
water flow	l/s	0.17	0.23
water side pressure drop	kPa	7	12
water connections	inch	½ F	½ F
Refrigerant		**R22**	
total cooling capacity	kW	4.4	5.5
sensible cooling capacity	kW	4.3	5.2
SHR (sensible/total ratio)		0.98	0.95
compressor absorbed power	kW	1.12	1.40
fan absorbed power	kW	0.20	0.23
unit absorbed power (compr. and fan)	kW	1.32	1.63
EER (Energy Efficiency Ratio — compressor and fan)		3.33	3.37
Condensing section (W model only) **water inlet temperature: 30°C – condensation temperature: 45°C(mid point)**			
condenser type		plate heat exchanger AISI 316	
quantity	no.	1	1
water flow	l/s	0.20	0.27
water side pressure drop	kPa	9	15
water connections	inch	½ F	½ F
DIMENSIONS			
length	mm	750	750
depth	mm	400	400
height	mm	1950	1950
footprint	m^2	0.30	0.30
WEIGHTS			
net	kg	160	170
gross (std. packing see Fig. 12j)	kg	165	175

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) — Condensing temperature: 45°C (mid point) — **EER** refers to the indoor unit only — Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*
***(2)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation.*

Technical Data

Follows Tab. 4h.

MODEL		S04G	S05G
power supply voltage (V ± 10%)	V/Ph/Hz	230/1/50	230/1/50
FANS (3)			
type		centrifugal with backward blades	
quantity	no.	1	1
speed	RPM	840	1050
poles	no.	4	4
fan OA	A	1.42	1.45
fan FLA	A	1.50	1.50
fan LRA	A	3.10	3.10
COMPRESSOR (4)			
quantity / type	no.	1 / Scroll	
Compressor rated power	Hp	1.4	1.9
compressor OA	A	5.33	6.77
compressor FLA	A	10.0	11.4
compressor LRA	A	35.0	47.0
EVAPORATING COIL			
quantity / configuration	no.	1 / inclined	
pipes/fins		Copper/treated alluminium	
fins spacing / rows	no.	1.8/4	1.8/4
front surface	m^2	0.29	0.29

(3) *Fan OA is for standard unit operating at the standard pressure drop (Under 20 Pa, Over 50 Pa).*
(4) *Condensing temperature: 45˚C (mid point).*

Options (further information: Chap. 8)

MODEL		S04G	S05G
power supply voltage (V ± 10%)	V/Ph/Hz	230/1/50	230/1/50
Electrical heating			
FLA	A	6.5	6.5
total power / steps	kW/no.	1.50/1	1.50/1
Re—heating mode			
Hot—gas coil			
heating capacity (@24˚C, 50%R.H., 45˚C condens.temp.)	kW	2.7	3.4
Hot—water coil			
Heating capacity (@24˚C, 50%R.H., 45˚C condens.temperature, 80/65˚C water temp.)	kW	2.6	3.0
Heating mode			
Hot—water coil			
heating capacity (@24˚C, 50%R.H., 80/65˚C water temp.)	kW	2.0	2.3

Technical Data

Tab. 4g — Constant, S—MxxK/L A/W series

MODEL		S04K/L	S05K/L	S07K	S10K	S12K	S13K	S17K	S20K	S23K	M25K
power supply voltage (V ± 10%)	V/Ph/Hz	230/1/50	230/1/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
PERFORMANCE (1)											
airflow	m^3/h	1120	1310	2040	2510	2600	4070	4780	5045	5580	6090
external static pressure (Over) ESP	Pa	50	50	50	50	50	50	50	50	50	50
sound pressure level (3) (Over)	dB(A)	46,2	47,8	50,4	51,7	54,1	51,8	53,0	52,8	56,1	
max available external static pressure (Over) (2)	Pa	260	200	260	150	110	300	250	300	270	350
external static pressure (frontal delivery) ESP	Pa	0	0	–	–	–	–	–	–	–	–
sound pressure level(3) (frontal delivery)	dB(A)	49.6	51.4	–	–	–	–	–	–	–	–
Refrigerant						**R407C**					
total cooling capacity	kW	4,6	5,7	8,2	10,6	12,4	14,4	17,3	20,5	26,7	26.4
sensible cooling capacity	kW	4,2	5,2	7,5	9,9	10,8	13,6	16,1	18,9	23,2	23.7
SHR (sensible/total ratio)		0,91	0,91	0,91	0,93	0,87	0,94	0,93	0,92	0,87	0.90
compressor absorbed power	kW	1,16	1,45	2,16	2,51	3,05	2,95	3,71	4,49	5,89	5.89
fan absorbed power	kW	0,20	0,23	0,34	0,40	0,43	0,86	0,97	1,49	1,85	1.52
unit absorbed power (compr. and fan)	kW	1,40	1,70	2,50	2,90	3,50	3,80	4,70	6,00	7,70	7.41
EER (in/output energy) —(compr. and fan)		3,29	3,35	3,28	3,66	3,54	3,79	3,68	3,42	3,47	3.56
opt. EC fan absorbed power	kW	–	–	*	*	*	0,61	0,71	0,95	1,46	1.00
EER (input/output energy) — opt. EC fan		–	–	*	*	*	4,07	3,94	3,82	3,66	3.83
Condensing section (W model only) water inlet temperature: 30°C – condensation temperature: 45°C(mid point)											
condenser type						plate type exchanger in AISI 316					
quantity	no.	1	1	1	1	1	1	1	1	1	1
water flow	l/s	0,17	0,23	0,20	0,26	0,31	0,33	0,41	0,50	0,67	0.63
water side pressure drop	kPa	7	12	8	13	18	8	11	16	27	18
water connections	inch	½ F	½ F	½ F	½ F	½ F	¾ F	¾ F	¾ F	¾ F	1 F
Refrigerant						**R22**					
total cooling capacity	kW	4,4	5,5	8,0	10,4	12,1	14,2	16,9	20,1	25,7	25.5
sensible cooling capacity	kW	4,2	5,1	7,5	9,8	10,7	13,4	15,8	18,7	22,6	23.2
SHR (sensible/total ratio)		0,95	0,93	0,94	0,94	0,88	0,94	0,93	0,93	0,88	0.91
compressor absorbed power	kW	1,12	1,40	2,07	2,42	3,06	2,82	3,53	4,55	5,67	5.67
fan absorbed power	kW	0,20	0,23	0,34	0,40	0,43	0,86	0,97	1,49	1,85	1.85
unit absorbed power (compr. and fan)	kW	1,3	1,6	2,4	2,8	3,5	3,7	4,5	6,0	7,5	7.2
EER (in/output energy) —(compr. and fan)		3,38	3,44	3,33	3,71	3,46	3,84	3,76	3,33	3,41	3.55
opt. EC fan absorbed power	kW	–	–	*	*	*	0,61	0,71	0,95	1,46	1.00
EER (input/output energy) — opt. EC fan		–	–	*	*	*	4,17	4,01	3,68	3,63	4.02
Condensing section (W model only) water inlet temperature: 30°C – condensation temperature: 45°C(mid point)											
condenser type						plate type exchanger in AISI 316					
quantity	no.	1	1	1	1	1	1	1	1	1	1
water flow	l/s	0,20	0,27	0,20	0,26	0,32	0,34	0,42	0,52	0,68	0.64
water side pressure drop	kPa	9	15	8	14	19	8	12	17	28	18
water connections	inch	½ F	½ F	½ F	½ F	½ F	¾ F	¾ F	¾ F	¾ F	1 F
DIMENSIONS											
length	mm	750	750	750	750	750	750	750	750	750	1000
depth	mm	400	400	500	500	500	750	750	750	750	850
height	mm	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
footprint	m^2	0.30	0.30	0.38	0.38	0.38	0.56	0.56	0.56	0.56	0.85
WEIGHTS											
net	kg	160	170	195	210	215	240	250	260	270	435
gross (std. packing see Fig. 12j)	kg	165	175	202	217	222	250	260	270	280	445

***(1) ON THE FOLLOWING STANDARD CONDITIONS**: Room conditions 24°C bs; 50% R.H. (17°C wb) — Condensing temperature: 45°C (mid point) — **EER** refers to the indoor unit only — Air flow of the units refers to the standard configuration with G4 class filter.*
***Note**: Cooling capacities are gross. To obtain the net cooling capacities the fan power input must be substracted.*

***(2)** Max. external static pressure for the indicated air flow*

***(3)** Measured in the front part at 1.5 m height, 2 m distance, referred to free field, with fan and compressor in operation.*

(*) To be defined

Technical Data

Follows Tab. 4i.

MODEL		S04	S05	S07	S10	S12	S13	S17	S20	S23	M25
power supply voltage (V ± 10%)	V/Ph/Hz	230/1/50	230/1/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
FANS (4)											
type						centrifugal with backward blades					
quantity	no.	1	1	1	1	1	1	1	1	1	1
speed	RPM.	835	1050	943	1153	1241	1047	1113	999	1136	986
poles	no.	4	4	4	4	4	4	4	4	4	4
fan OA – std / opt fan	A	1,42/–	1,45/–	2,2/*	2,33/*	2,37/*	2,59/0,98	2,59/1,16	4,63/1,53	4,44/2,37	4.70/1.61
fan FLA – std / opt fan	A	1,5/–	1,5/–	2.6/*	2.6/*	2.6/*	2.8/4.0	2.8/4.0	4.80/4.0	4.80/4.0	4.80/3.60
fan LRA – std / opt fan	A	3,1/–	3,1/–	4.9/*	4.9/*	4.9/*	9.9/0.1	9.9/0.1	18.0/0.1	18.0/0.1	18.0/0.10
COMPRESSOR (5)											
quantity / type	no.					1 / Scroll					
Compressor rated power	Hp	1.40	1.90	2.50	3.25	4.0	4.0	5.0	6.0	7.8	7.8
compressor OA (R407C)	A	5,33	6,77	4,19	4,76	5,78	5,15	6,29	6,55	11,08	11.08
compressor OA (R22)	A	5,10	6,59	3,95	4,55	5,76	5,77	6,93	7,25	10,72	10.72
compressor FLA	A	10.0	11.4	5.6	7.0	10.0	8.0	9.6	11.5	16.4	16.4
compressor LRA	A	35.0	47.0	40.0	46.0	50.0	55.0	66.5	73.0	95.0	95.0
EVAPORATING COIL											
quantity / configuration	no.					1 / inclined					
pipes/fins						Copper/treated alluminium					
fin pitch / rows	mm/no.	1,8/4	1,8/4	2.1/3	1.8/4	1.8/4	1.8/3	1.8/3	1.8/4	1.8/5	2.1/5
front surface	m^2	0,29	0,29	0.48	0.48	0.48	0.65	0.65	0.65	0.65	0.85
Hot–gas coil											
heating capacity (@24°C, 50%R.H., 45°C condensing temperature, R407C)	kW	2,8	3,4	5,0	6,3	7,4	8,3	10,1	12,0	15,6	12.1
Humidifier											
FLA	A	6,5	6,5	5,0	5,0	5,0	13.0	13.0	13.0	13.0	13.0
nominal power	kW	1,5	1,5	3,40	3,40	3,40	9,00	9,00	9,00	9,00	9.00

(4) *Fan OA is for standard unit operating at the standard pressure drop (Under 20 Pa, Over 50 Pa).*
(5) *Condensing temperature: 45°C (mid point).*
(*) To be defined

Options (further information: Chap. 8)

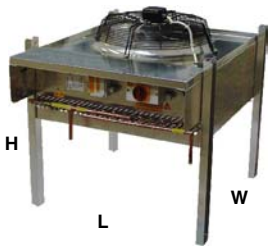
MODEL		S04	S05	S07	S10	S12	S13	S17	S20	S23	M25
power supply voltage (V ± 10%)	V/Ph/Hz	230/1/50	230/1/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Electrical heating (opt.)											
FLA	A	6.5	6.5	6.5	6.5	6.5	8,4	8,4	8,4	8,4	8,4
total power / steps	kW/no.	1.50/1	1.50/1	4.50/3	4.50/3	4.50/3	5.85/3	5.85/3	5.85/3	5.85/3	5.85/3

5 Heat Rejections (A – D versions)

Coupling of room units with remote air–cooled condensers

The units should be connected to **Liebert Hiross HPA**, single or double circuit.

The following paragraphs describe the suggested coupling of **Liebert Hiross HPM** units. The data given below are approximate and must always be verified on the basis of the other specific operating conditions.



Tab. 5a – Coupling of Condensers with Liebert Hiross HPM A–D

MODEL	External temperature up to 35°C		External temperature up to 40°C		External temperature up to 46°C	
	standard	low noise	standard	low noise	standard	low noise
S04 A	1 x HCE07	1 x HCE07	1 x HCE07	1 x HCE10	1 x HCE14	1 x HCE14
S05 A	1 x HCE07	1 x HCE07	1 x HCE10	1 x HCE14	1 x HCE14	1 x HCE17
S07 A	1 x HCE10	1 x HCE14	1 x HCE14	1 x HCE14	1 x HCE24	1 x HCE24
S10 A	1 x HCE14	1 x HCE14	1 x HCE17	1 x HCE24	1 x HCE24	1 x HCE29
S12 A	1 x HCE14	1 x HCE17	1 x HCE17	1 x HCE24	1 x HCE24	1 x HCE33
S13 A/D	1 x HCE14	1 x HCE17	1 x HCE24	1 x HCE24	1 x HCE29	1 x HCE33
S17 A/D	1 x HCE24	1 x HCE24	1 x HCE24	1 x HCE24	1 x HCE33	1 x HCE33
S20 A/D	1 x HCE24	1 x HCE24	1 x HCE33	1 x HCE33	1 x HCE42	1 x HCE42
S23 A/D	1 x HCE29	1 x HCE29	1 x HCE42	1 x HCE42	1 x HCE49	1 x HCE49
M25 A/D	1 x HCE29	1 x HCE29	1 x HCE42	1 x HCE42	1 x HCE49	1 x HCE49
M29 A	1 x HCE29	1 x HCE33	1 x HCE42	1 x HCE49	1 x HCE58	1 x HCE74
M31 A/D	1 x HCE29	1 x HCE33	1 x HCE42	1 x HCE49	1 x HCE58	1 x HCE74
M34 A/D	2 x HCE24 or 1 x HBE33	2 x HCE24	2 x HCE24 or 1 x HBE49	2 x HCE24	2 x HCE33 or 1 x HBE74	2 x HCE33
M35 A/D	1 x HCE33	1 x HCE42	1 x HCE42	1 x HCE49	1 x HCE74	1 x HCE87
M41 A/D	1 x HCE42	1 x HCE49	1 x HCE58	1 x HCE58	1 x HCE74	1 x HCE87
M42 A/D	2 x HCE24	2 x HCE24 or 1 x HBE49	2 x HCE33 or 1 x HBE49	2 x HCE33 or 1 x HBE74	2 x HCE42 or 1 x HBE74	2 x HCE42 or 1 x HBE87
M47 A/D	1 x HCE49	1 x HCE49	1 x HCE74	1 x HCE74	1 x HCE87	1 x HCE95
M50 A/D	2 x HCE29 or 1 x HBE49	2 x HCE29	2 x HCE42 or 1 x HBE74	2 x HCE42 or 1 x HBE87	2 x HCE49 or 1 x HBE87	2 x HCE49 or 1 x HBE99
M58 A/D	2 x HCE29 or 1 x HBE49	2 x HCE33	2 x HCE42 or 1 x HBE74	2 x HCE49 or 1 x HBE87	2 x HCE58 or 1 x HBE99	2 x HCE74
M66 A	2 x HCE33	2 x HCE42	2 x HCE42 or 1 x HBE87	2 x HCE49	2 x HCE74 or 1 x HBE99	2 x HCE87
L83 A/D	2 x HCE 42 or 1 x HBE 87	2 x HCE 42 or 1 x HBE 87	2 x HCE 49 or 1 x HBE 99	2 x HCE 58 or 1 x HBE 99	2 x HCE 74	2 x HCE 87
L99 A	2 x HCE 49 or 1 x HBE 87	2 x HCE 49 or 1 x HBE 99	2 x HCE 58 or 1 x HBE 99	2 x HCE 74 or 1 x HBE 99	2 x HCE 87	2 x HCE 95

Heat Rejections (A — D versions)

Tab. 5b — Technical data and performance of Air condenser

Model		Power supply [V/Ph/Hz]	Total Heat Rejection (THR)*		Air Volume [m3/h]	Noise Level ** [dB(A)] @ 5 m	Input Power [kW]	Current Absorption [A]	FLA [A]	Refrigerant connections [mm]		Unit with packing	
			R407C [kW]	R22 [kW]						Gas line [mm]	Liquid line [mm]	Dimensions [mm]	Weight [kg]
HCE 07	std	230/1/50	7.8	7.7	2400	45.5	0.18	0.85	0.85	16	16	L 720 W 450 H 740	17
	low noise		5.7	5.7	1582	39.5	0.11	0.80					
HCE 10	std	230/1/50	9.4	9.4	2300	45.5	0.18	0.85	0.85	18	18	L 720 W 450 H 740	21
	low noise		6.6	6.6	1516	39.5	0.11	0.80					
HCE 14	std	230/1/50	14.6	14.4	4600	44.5	0.27	1.20	1.2	18	16	L 1120 W 960 H 995	65
	low noise		11.3	11.2	3261	40.6	0.18	1.14					
HCE 17	std	230/1/50	15.9	15.7	4600	44.5	0.27	1.20	1.2	18	16	L 1120 W 960 H 995	65
	low noise		12.2	12.1	3261	40.6	0.18	1.14					
HCE 24	std	230/1/50	25.3	25.0	8300	50.5	0.56	2.50	3	22	22	L 1410 W 1175 H 1010	86
	low noise	230/1/50	21.2	21.1	6524	40.2	0.42	2.41	3				
HCE 29	std	230/1/50	28.9	28.8	7800	50.5	0.56	2.50	3	28	28	L 1410 W 1175 H 1010	96
	low noise	230/1/50	24.2	24.1	6131	40.2	0.42	2.41	3				
HCE 33 HBE 33	std	230/1/50	31.8	31.5	9200	47.5	0.54	2.40	2.4	28	22	L 1940 W 980 H 1010	107
	low noise		24.4	24.2	6523	43.3	0.36	2.28		22	22		
HCE 42	std	230/1/50	42.2	41.6	16600	53.5	1.12	5.00	5	35	28	L 2420 W 1195 H 1010	143
	low noise	230/1/50	36.0	35.9	13048	42.6	0.85	4.82	5				
HCE 49 HBE 49	std	230/1/50	50.4	49.9	16600	53.5	1.12	5.00	5	35	22	L 2420 W 1195 H 1010	143
	low noise	230/1/50	42.3	41.9	13048	42.6	0.85	4.82	5	22	22		
HCE 58	std	230/1/50	58.1	57.6	15600	53.5	1.12	5.00	5	42	35	L=2420 W=1195 H=1010	152
	low noise	230/1/50	48.2	48.1	12262	42.6	0.85	4.82	5				
HCE 74 HBE 74	std	230/1/50	75.7	74.9	24900	54.5	1.68	7.50	7.5	42	35	L=3420 W=1195 H=1010	206
	low noise	230/1/50	63.5	62.9	19571	43.4	1.27	7.23	7.5	28	28		
HCE 87 HBE 87	std	230/1/50	87.1	86.4	23400	54.5	1.68	7.50	7.5	54	42	L=3420 W=1195 H=1010	235
	low noise	230/1/50	72.2	72.1	18392	43.4	1.27	7.23	7.5	35	28		
HCE 95	std	230/1/50	90.6	90.5	24000	54.5	1.68	7.50	7.5	54	42	L=3420 W=1195 H=1010	265
	low noise	230/1/50	75.5	75.4	18864	43.4	1.27	7.23	7.5				
HBE 99	std	230/1/50	116.4	115.2	31200	55.5	2.24	10.00	10	35	28	L=4420 W=1195 H=1010	305
	low noise	230/1/50	95.9	95.2	24523	44.2	1.70	9.65	10				

(*) The nominal capacities refer to the following operative conditions:

- refrigerant as indicated (R407C or R22).
- temperature differences: 15 K (T condensation − Toutdoor). For R407C the condensing temperature is the **mid point** temperature.
- height of the installation = 0 m, above the sea level. For different altitudes, see Hirating program.
- clean exchange surfaces.

(**) The levels of sound pressure here included are measured in the same operative conditions, and are referred to 5 m far from the unit, at 1.5 m in height in free field conditions.

Coupling of water cooled units with remote Dry Coolers

The water–condensed units are provided with a water/refrigerant exchanger with braze–welded **plates** made of **stainless steel**; this advanced exchanger type gives the highest efficiency in heat exchange. In addition, a certain oversizing of the exchanger has been provided so as to reduce pressure drops (and energy consumption of the water pump) as much as possible and thus to allow the unit to operate with the external chiller in closed circuit, even at high outdoor temperatures.

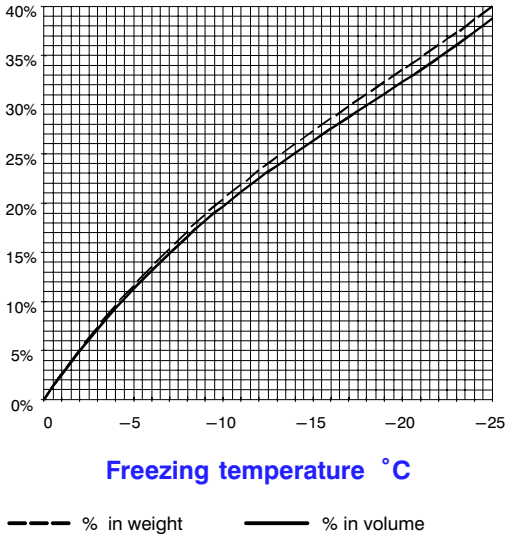
The O/UW units are designed for operating with mains water or water in closed circuit with an external chiller.
When operating in a closed circuit, the water is cooled by the outdoor air in a heat exchanger; in this case, to avoid unwanted ice formation during winter, it is advisable to use a water/glycol mixture.

The circulation of the water–glycol mixture is forced (the pump is not supplied). If mains water or tower water is used, when installing the unit fit a mechanical filter on the water line to protect the condenser against possible impurities contained in the water (for condenser cleaning see the service manual).

Dry Coolers

Our dry–coolers are built with a copper/aluminium cooling coil and axial fan(s).
The main data on dry coolers is shown in the following table:

Percentage of ethylene glycol mixed with water



Note:
In the closed circuits to avoid water freezing in the cold seasons, it is strictly recommended to mix water with ethylene glycol. The suggested percentage is given in the Diagram.
For safety reason, **calculate the percentage** at least at 5°C below the minimum ambient temperature.

It is also recommended to check periodically the mixture: in case of leackage of the circuit, the sanitary water, used at compensation, reduces progressively the glycol percentage and increases the freezing point of the mixture!

Heat Rejections (W — F — H versions)

Tab. 5c — Coupling of Dry—coolers

Model	External temperature up to 30ºC		External temperature up to 35ºC		External temperature up to 40ºC	
	Standard	Low noise	Standard	Low noise	Standard	Low noise
S04 W	1 x DSM009	1 x DLM008	1 x DSM009	1 x DLM008	1 x DSM018	1 x DLM015
S05 W	1 x DSM009	1 x DLM008	1 x DSM009	1 x DLM008	1 x DSM018	1 x DLM015
S07 W	1 x DSM009	1 x DLM008	1 x DSM009	1 x DLM008	1 x DSM018	1 x DLM015
S10 W	1 x DSM009	1 x DLM008	1 x DSM009	1 x DLM008	1 x DSM022	1 x DLM018
S12 W	1 x DSM013	1 x DLM011	1 x DSM013	1 x DLM015	1 x DSM022	1 x DLM018
S13 W/H/F	1 x DSM013	1 x DLM011	1 x DSM013	1 x DLM015	1 x DSM022	1 x DLM018
S17 W/H/F	1 x DSM013	1 x DLM011	1 x DSM018	1 x DLM015	1 x DSM028	1 x DLM023
S20 W/H/F	1 x DSM013	1 x DLM015	1 x DSM022	1 x DLM023	1 x DST030	1 x DLT030
S23 W/H/F	1 x DSM018	1 x DLM018	1 x DSM028	1 x DLT027	1 x DST050	1 x DLT047
M25 W/H/F	1 x DSM018	1 x DLM018	1 x DSM028	1 x DLT027	1 x DST050	1 x DLT047
M29 W	1 x DSM018	1 x DLM018	1 x DSM028	1 x DLT027	1 x DST050	1 x DLT047
M31 W/H/F	1 x DSM018	1 x DLM018	1 x DSM028	1 x DLT027	1 x DST050	1 x DLT047
M34 W/H/F	1 x DSM028	1 x DLT027	1 x DST030	1 x DLT040	1 x DST070	1 x DLT065
M35 W/H/F	1 x DSM028	1 x DLT027	1 x DST030	1 x DLT040	1 x DST070	1 x DLT065
M41 W/H/F	1 x DST030	1 x DLT027	1 x DST040	1 x DLT040	1 x DST080	1 x DLT085
M42 W/H/F	1 x DST030	1 x DLT030	1 x DST040	1 x DLT040	1 x DST080	1 x DLT085
M47 W/H/F	1 x DST030	1 x DLT040	1 x DST050	1 x DLT047	1 x DST110	1 x DLT085
M50 W/H/F	1 x DST040	1 x DLT040	1 x DST050	1 x DLT055	1 x DST110	1 x DLT085
M58 W/H/F	1 x DST040	1 x DLT040	1 x DST060	1 x DLT055	1 x DST110	1 x DLT110
M66 W	1 x DST050	1 x DLT040	1 x DST070	1 x DLT065	1 x DST135	1 x DLT130
L83 W/H/F	1 x DST 070	1 x DLT 065	1 x DST 080	1 x DLT 085	1 x DST 135	1 x DLT 130
L99 W	1 x DST 080	1 x DLT 085	1 x DST 110	1 x DLT 110	1 x DST 175	1 x DLT 160

Heat Rejections (W — F — H versions)

Tab. 5d — Technical data and performance of Dry Coolers

	Performances			Electric data			Overall dimensions		
Standard Model	**Duty** *(a)*	**Air flow**	**Noise level** *(c)*	**Supply**	**Number of fans**	**Total absorbed power**	**Width**	**Depth**	**Height** *(b)*
	kW	**m^3/h**	**db(A)**	**V/ph/Hz**	**n°**	**kW**	**mm**	**mm**	**mm**
DSM009	9.0	6600	50	230/1/50	1	0.64	1250	900	990
DSM013	13.5	5100	50	230/1/50	1	0.64	1250	900	990
DSM018	17.6	13200	53	230/1/50	2	1.28	2050	900	990
DSM022	22.4	12600	53	230/1/50	2	1.28	2050	900	990
DSM028	27.5	18900	54	230/1/50	3	1.92	2850	1260	990
DST030	33.0	20500	55	400/3/50	2	1.44	2750	1260	1140
DST040	39.0	20000	55	400/3/50	2	1.44	2730	1260	1140
DST050	50.0	30750	57	400/3/50	3	2.16	3900	1260	1140
DST060	58.0	30000	57	400/3/50	3	2.16	3900	1260	1140
DST070	68.0	28350	57	400/3/50	3	2.16	3900	1260	1140
DST080	80.0	40000	58	400/3/50	4	2.88	5060	1260	1140
DST110	108.0	52500	59	400/3/50	3	4.35	5010	1640	1500
DST135	134.0	70000	60	400/3/50	4	5.80	6520	1640	1500
DST175	175.0	110000	64	400/3/50	4	12.80	6520	1640	1570
DST220	220.0	106000	64	400/3/50	4	12.80	6520	1640	1570
DST270	270.0	132500	65	400/3/50	5	16.00	8055	1640	1570
DST290	284.0	204000	67	400/3/50	8	25.60	6155	2420	1570
DST330	326.0	208000	63	400/3/50	8	17.60	7355	2440	1770
DST360	362.0	255000	68	400/3/50	10	32.00	7555	2420	1770
DST400	400.0	190000	63	400/3/50	8	17.60	7355	2440	1770
DST450	447.0	235000	68	400/3/50	10	32.00	7555	2420	1570
DST500	500.0	237500	64	400/3/50	10	32.00	9055	2440	1770

	Performances			Electric data			Overall dimensions		
Low Noise Model	**Duty** *(a)*	**Air flow**	**Noise level** *(c)*	**Supply**	**Number of fans**	**Total absorbed power**	**Width**	**Depth**	**Height** *(b)*
	kW	**m^3/h**	**db(A)**	**V/ph/Hz**	**n°**	**kW**	**mm**	**mm**	**mm**
DLM008	7.5	4700	39	230/1/50	1	0.29	1250	900	990
DLM011	10.5	3700	39	230/1/50	1	0.29	1250	900	990
DLM015	15.5	9500	42	230/1/50	2	0.58	2050	900	990
DLM018	18.0	9000	42	230/1/50	2	0.58	2050	900	990
DLM023	23.0	14000	43	230/1/50	3	0.87	2850	1260	990
DLT027	27.5	15000	47	400/3/50	2	0.70	2750	1260	1140
DLT030	30.0	14500	47	400/3/50	2	0.70	2730	1260	1140
DLT040	40.0	22500	49	400/3/50	3	1.05	3900	1260	1140
DLT047	47.0	21750	49	400/3/50	3	1.05	3900	1260	1140
DLT055	54.0	20250	49	400/3/50	3	1.05	3900	1260	1140
DLT065	65.0	29000	50	400/3/50	4	1.40	5060	1260	1140
DLT085	84.0	40500	54	400/3/50	3	2.16	5010	1640	1500
DLT110	112.0	54000	55	400/3/50	4	2.88	6520	1640	1500
DLT130	130.0	67000	51	400/3/50	4	3.72	6520	1640	1570
DLT160	157.0	62000	51	400/3/50	4	3.72	6520	1640	1570
DLT190	190.0	77500	52	400/3/50	5	4.65	8055	1640	1570
DLT210	212.0	123000	54	400/3/50	8	7.44	6155	2420	1570
DLT250	253.0	132000	51	400/3/50	8	6.88	7355	2440	1770
DLT270	270.0	153750	55	400/3/50	10	9.30	7555	2420	1770
DLT290	290.0	118000	51	400/3/50	8	6.88	7355	2440	1770
DLT310	310.0	137500	55	400/3/50	10	9.30	7555	2420	1570
DLT350	350.0	147500	52	400/3/50	10	8.60	9055	2440	1770

***(a)**: at the following conditions: outdoor temperature = 35˚C, inlet/outlet water temperature = 45˚C/40˚C.*
***(b)**: vertical flow installation.*
***(c)**: sound pressure level, free field, at 10 m distance, according to DIN 45635*

6 Airflow characteristics

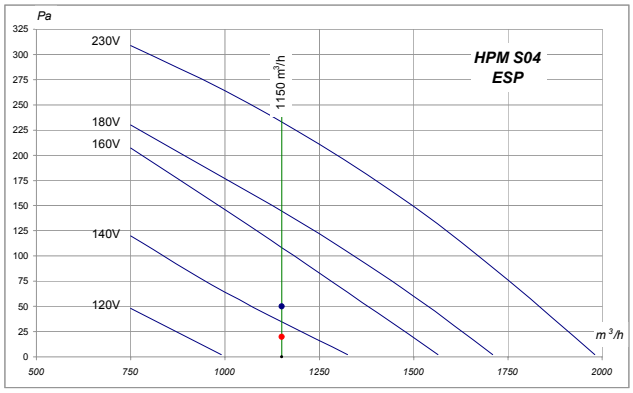
The graphs give the available and allowed external static pressure against airflow at different motor supply voltages for all units, with G4 air filter, standard configuration.

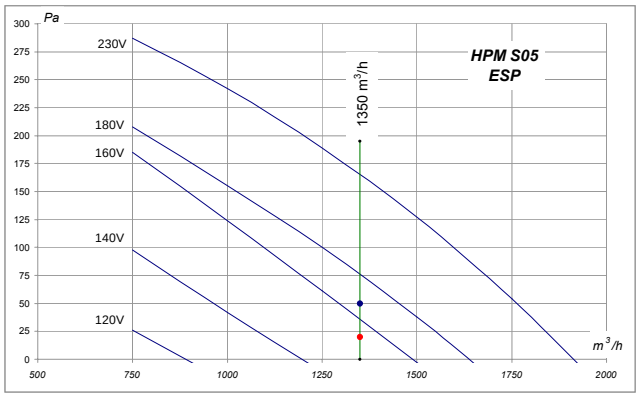
Useful available heads with standard fan

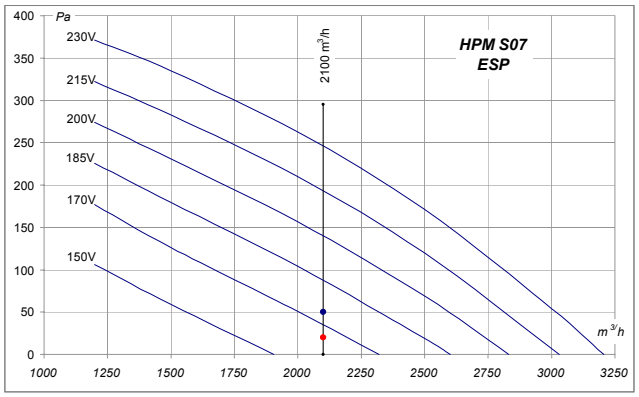
The air conditioners of the Liebert Hiross HPM S series are supplied with electric fans sized for 20 Pa Available External Static Pressure (ESP) for the models Under, 50 Pa for the models Over.

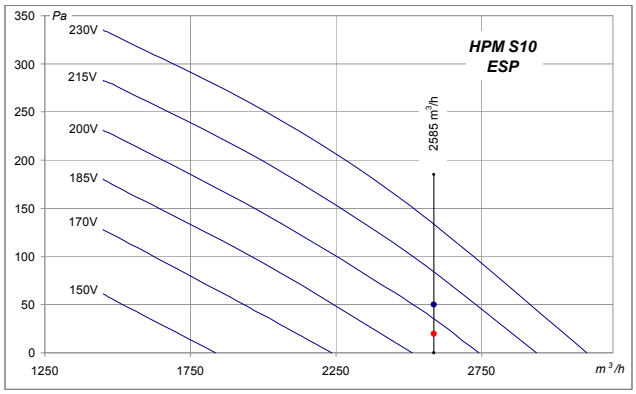
ESP: Available External Static Pressure

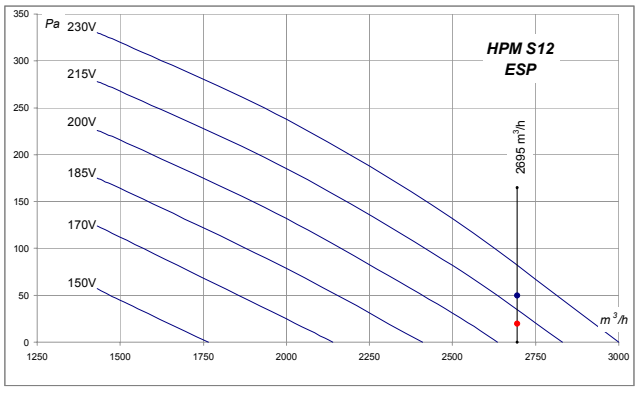
Liebert Hiross HPM – A/W versions and U/O/K configurations

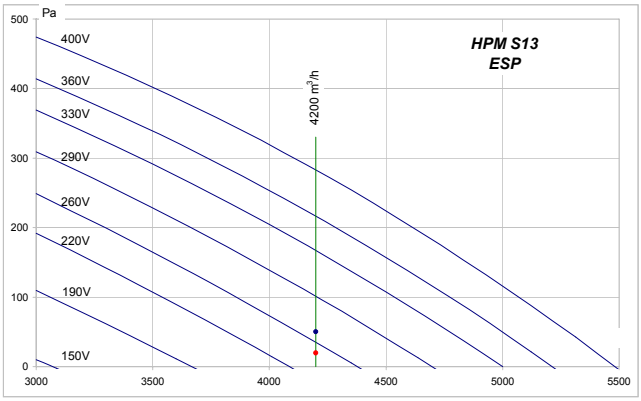




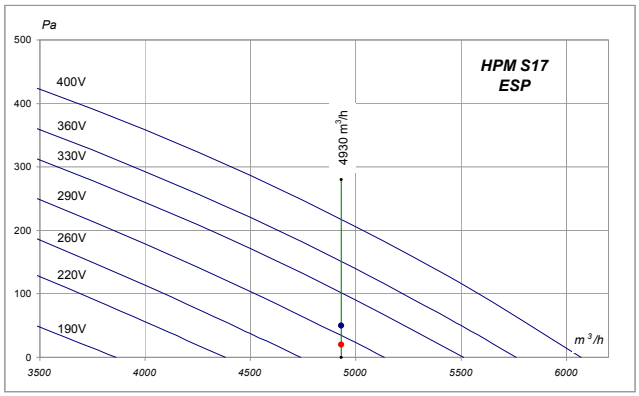


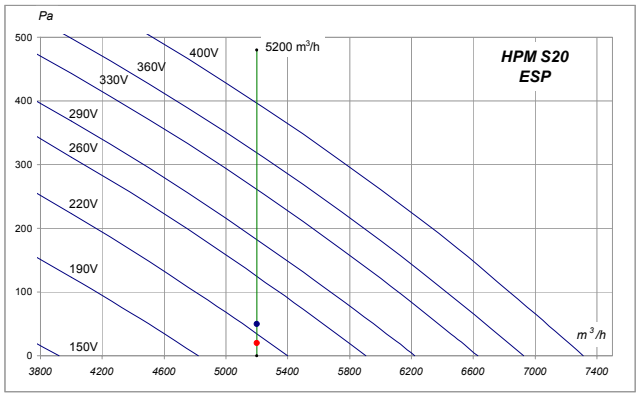


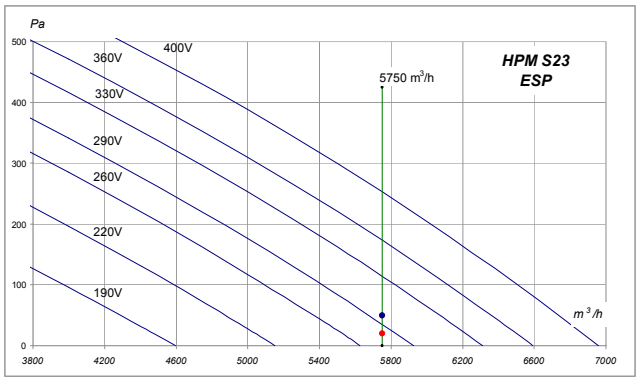


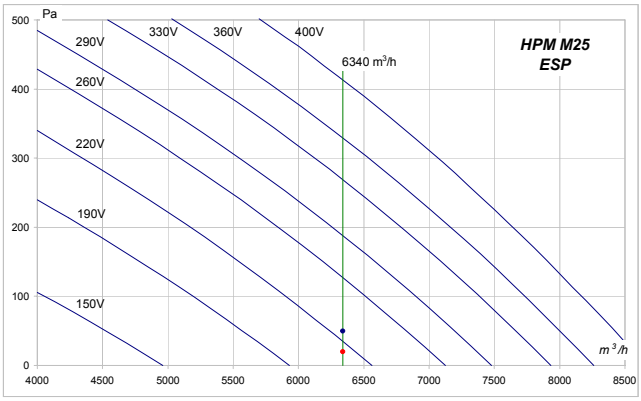


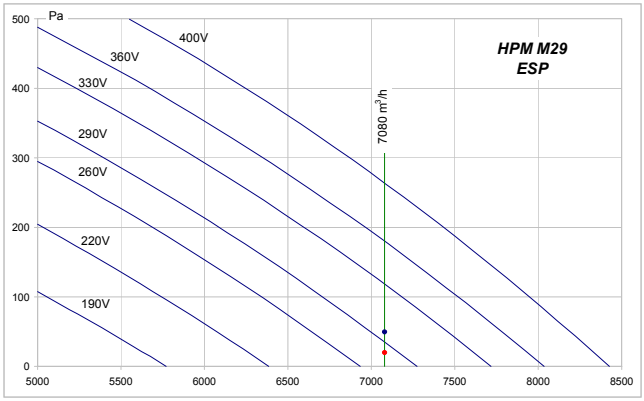
Airflow characteristics

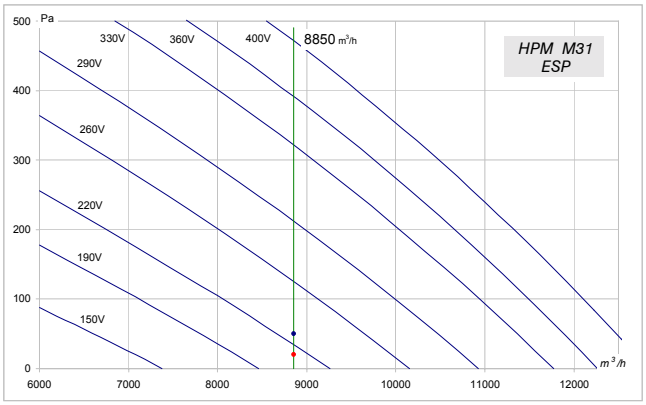


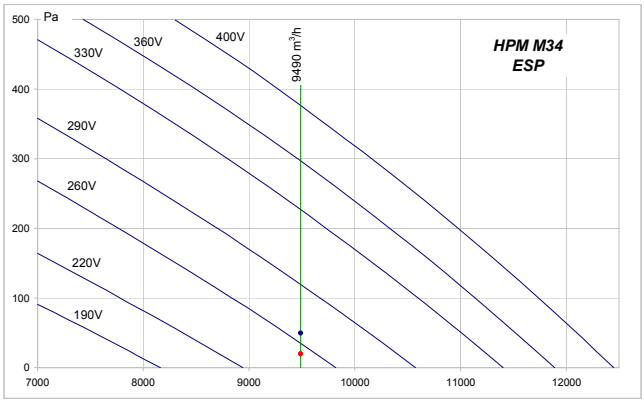


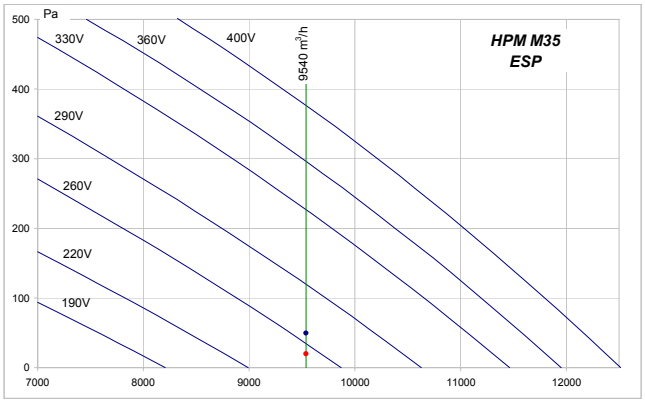




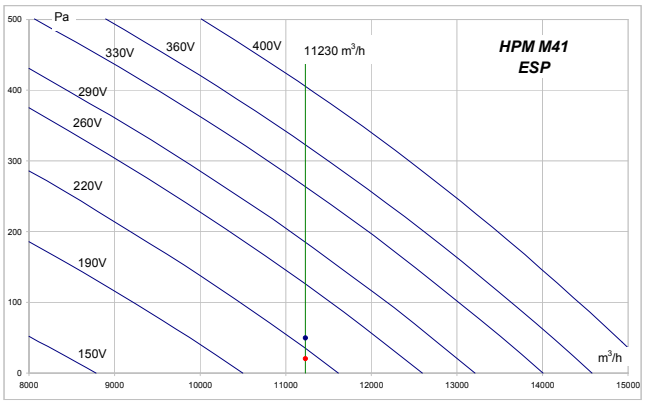


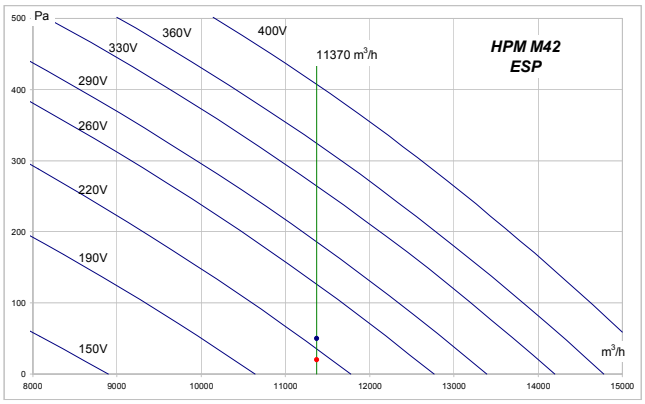


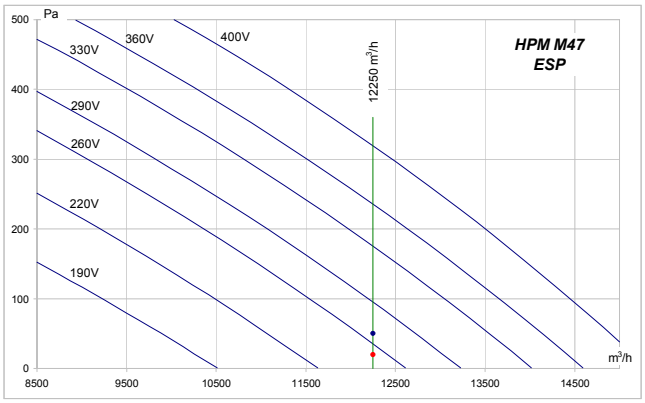


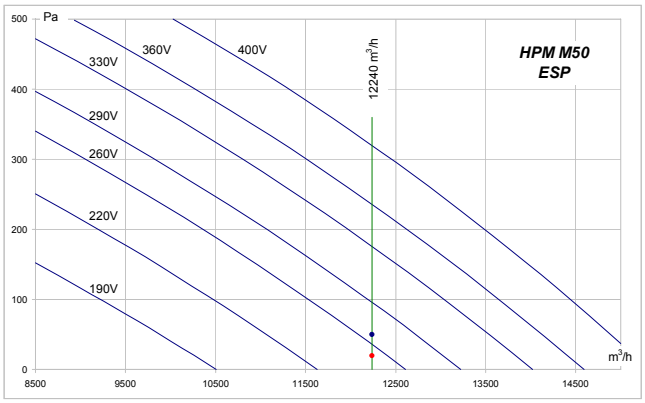


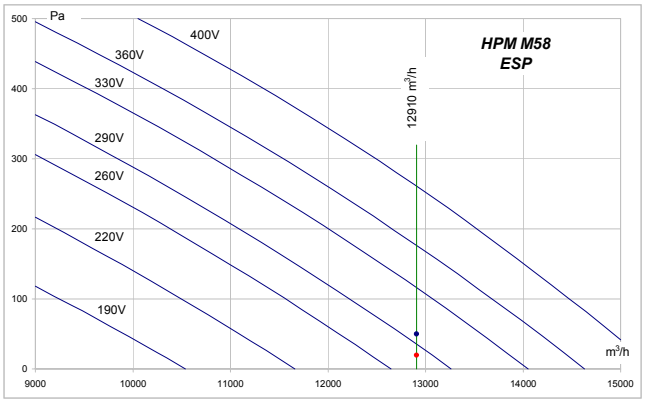
Airflow characteristics

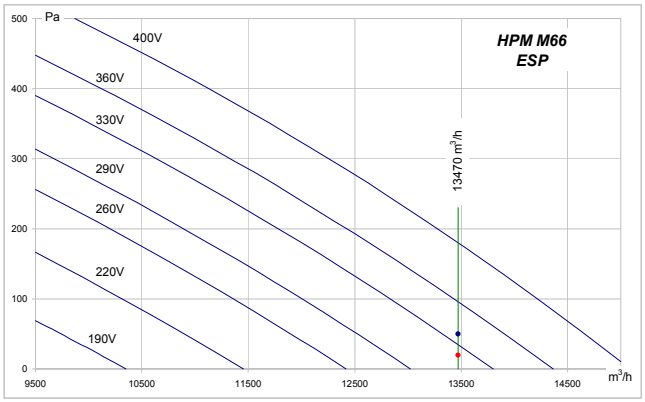


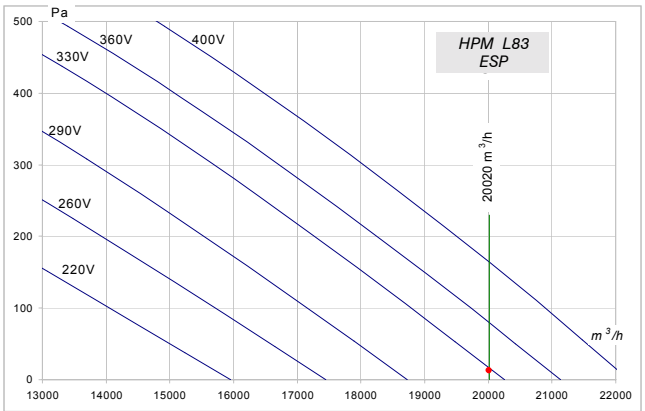


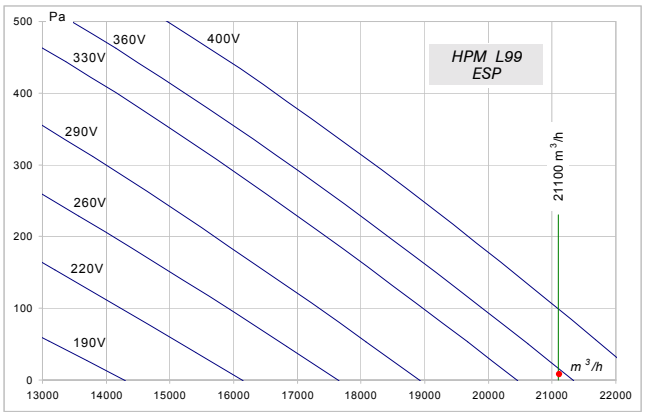






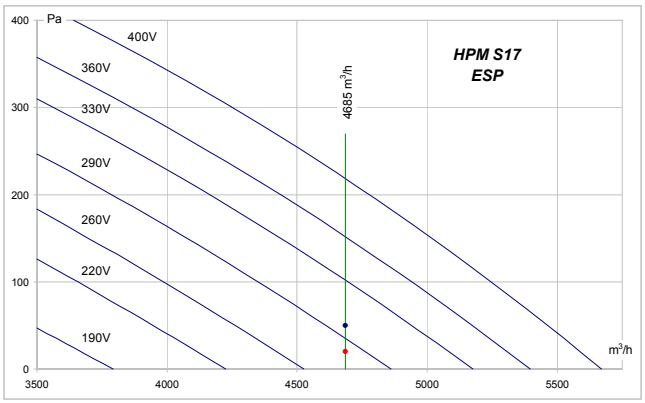


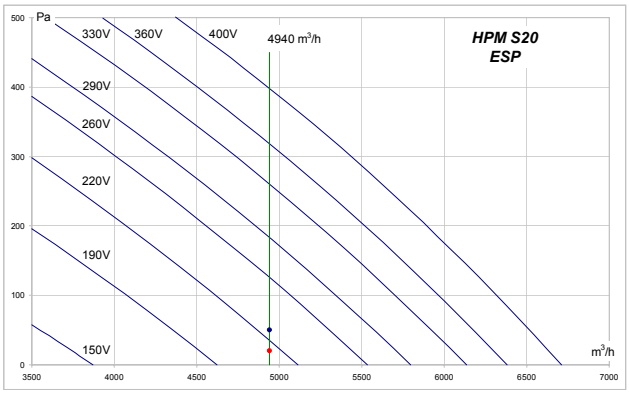


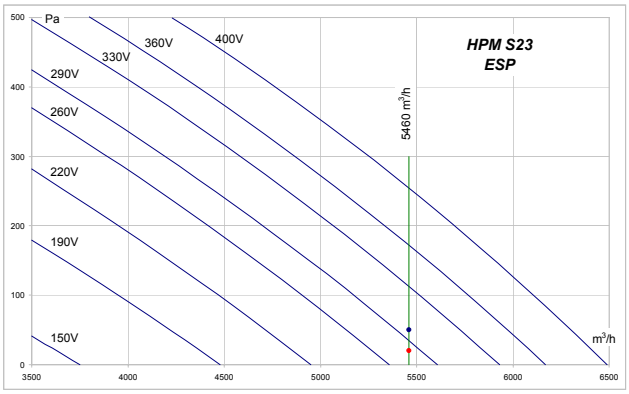


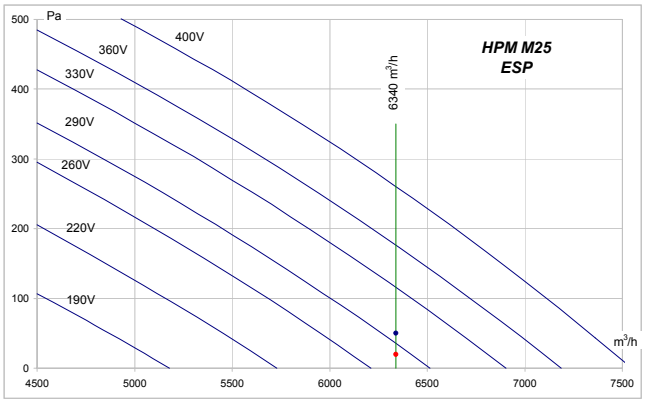
Airflow characteristics

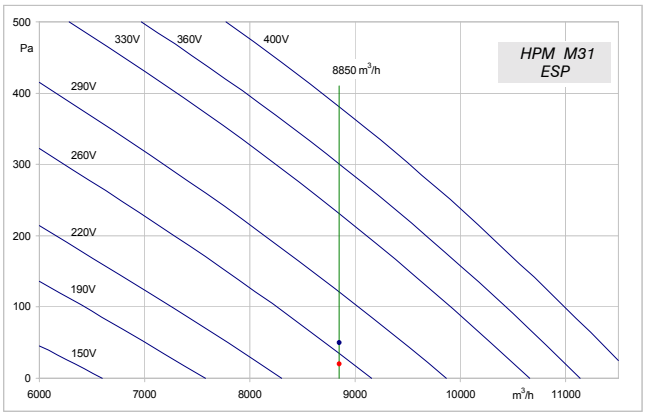
Liebert Hiross HPM – F/D/H versions and U/O/K configurations

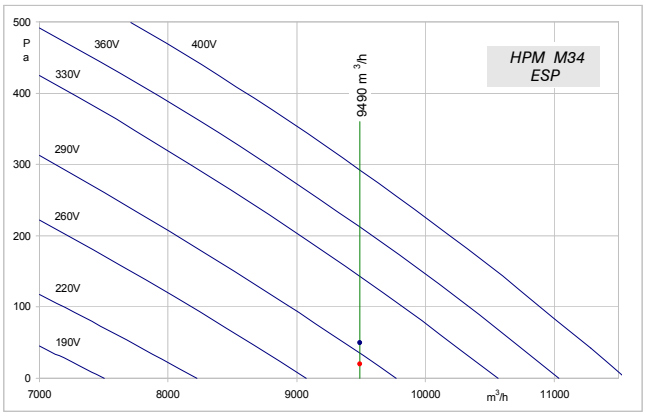


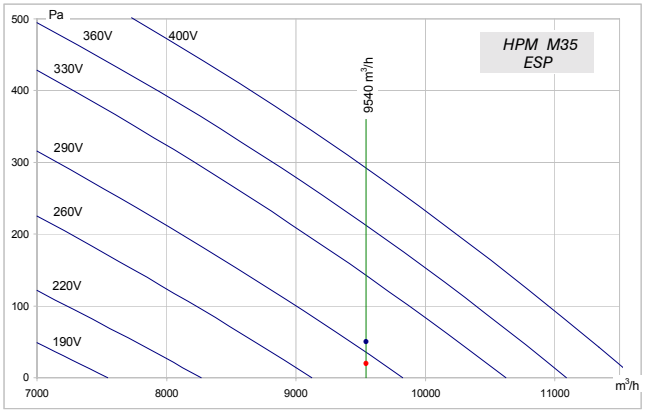


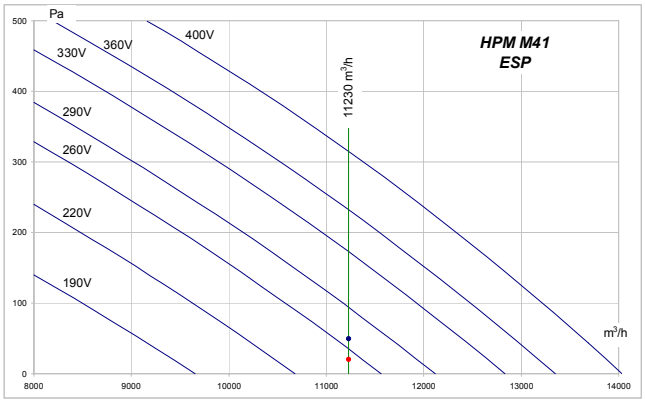




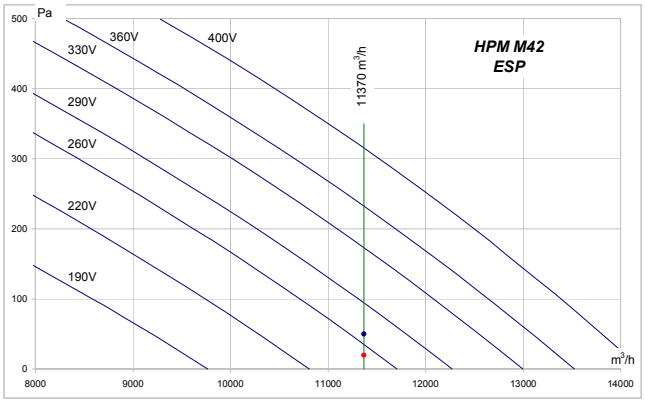


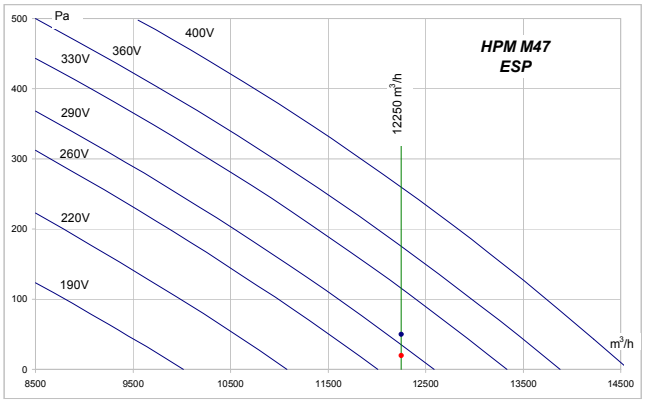


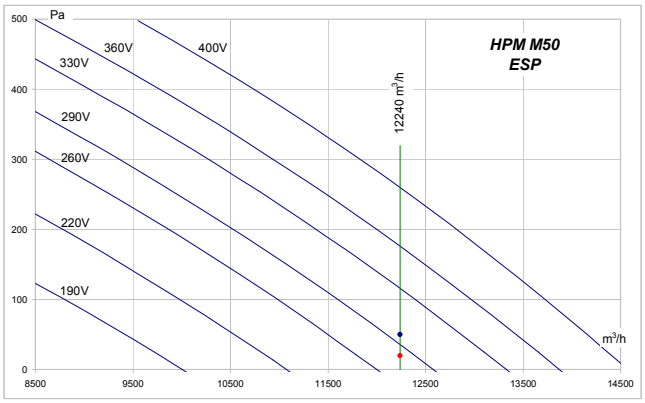


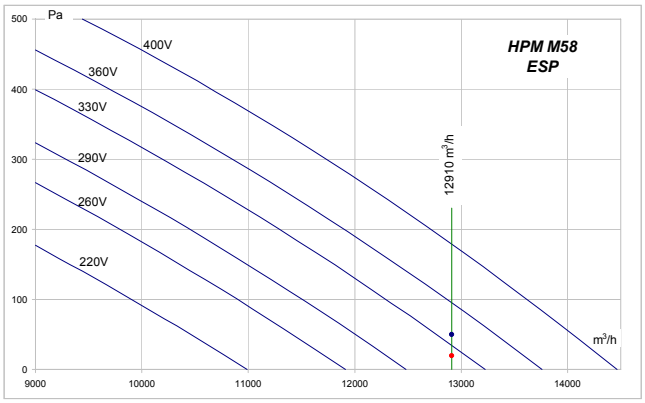


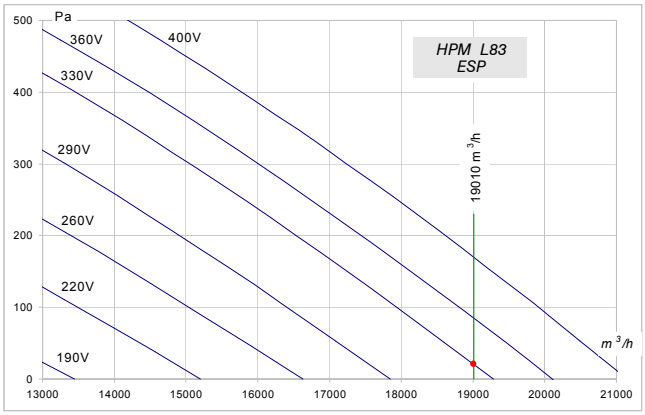
Airflow characteristics









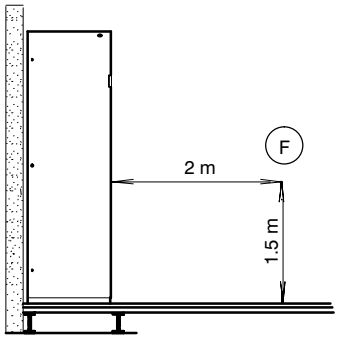


7 Sound Pressure Level

Liebert Hiross HPM units have been designed with particular care for sound and vibration problems. The complete mechanical insulation of the ventilating section, combined with the special study of the aeraulic circuit as a consequence of accurate researches made in our thermodynamical laboratories and the oversizing of the components crossed by air offer the highest ventilation efficiency with the lowest sound emission.

Sound emission spectra

All tests are performed in our laboratories under the described conditions. The instrument is placed in (F) point, at 1.5 m from the ground in front of the machine at 2 m distance. Test conditions: Under unit with underflow air discharge and 20 Pa available external static pressure; Over unit with ducted air discharge and 50 Pa available external static pressure. Standard air flow with clean G4 filters. Ambient temperature 24°C and relative humidity 50%. Condensing temperature 45°C. **The noise levels refer to free field conditions.**



Sound Pressure Level

Sound emission spectra

The following tables show sound levels for every octave band frequency.

Tab. 7a — A/W versions and Under configuration

MODEL	Mode	Level	Octave band frequency (Hz)									Sound Level [dB(A)]
			31.5	63	125	250	500	1000	2000	4000	8000	
S04UA/W	(1)	SPL	43.2	43.2	46.0	46.5	42.9	38.6	36.1	27.8	13.9	44.8
	(2)	SPL	44.1	44.1	46.5	48.3	43.5	39.2	36.2	27.9	16.4	45.5
	(3)	PWL	58.6	58.6	60.1	61.1	56.7	52.6	50.4	47.8	43.8	59.3
S05UA/W	(1)	SPL	42.7	42.7	47.3	48.7	44.0	39.1	37.3	29.5	18.5	46.0
	(2)	SPL	43.4	43.4	47.6	49.5	44.3	39.5	37.4	29.6	19.2	46.4
	(3)	PWL	62.4	62.4	63.8	64.0	60.3	56.4	54.3	51.8	46.0	62.9
S07UA/W	(1)	SPL	46.5	46.5	57.6	48.7	42.6	36.9	31.5	25.2	10.8	46.1
	(2)	SPL	46.8	46.8	57.7	48.8	44.6	38.7	35.6	32.7	22.9	47.3
	(3)	PWL	62.6	62.6	64.2	63.9	62.6	58.3	58.9	59.8	58.0	66.7
S10UA/W	(1)	SPL	39.8	39.8	54.9	51.9	44.5	40.4	36.8	29.0	20.7	47.8
	(2)	SPL	40.3	40.3	55.0	52.0	45.1	40.8	37.5	31.4	22.7	48.2
	(3)	PWL	66.5	66.5	67.9	67.6	64.9	60.6	59.2	58.4	51.5	67.5
S12UA/W	(1)	SPL	43.3	43.3	50.3	55.8	46.1	40.6	38.2	31.4	24.7	49.9
	(2)	SPL	43.9	43.9	50.8	55.9	47.1	41.5	39.5	34.7	26.8	50.5
	(3)	PWL	68.0	68.0	69.8	69.1	66.8	62.6	61.3	60.7	53.1	69.5
S13UA/W	(1)	SPL	42.2	42.2	49.2	54.7	45.0	39.5	37.1	30.3	23.6	48.8
	(2)	SPL	42.9	42.9	49.8	54.8	45.6	39.6	37.2	32.5	24.9	49.0
	(3)	PWL	68.4	68.4	74.6	74.5	71.8	67.0	64.2	62.2	55.8	73.6
S17UA/W	(1)	SPL	44.3	44.3	50.3	57.4	47.0	41.3	38.7	32.2	25.6	51.1
	(2)	SPL	45.0	45.0	51.1	57.5	47.6	41.4	38.8	34.4	26.9	51.3
	(3)	PWL	68.4	68.4	74.8	74.5	71.8	67.0	64.2	62.2	55.8	73.6
S20UA/W	(1)	SPL	47.3	47.3	51.7	53.9	48.1	44.5	41.8	35.6	32.5	50.9
	(2)	SPL	48.2	48.2	53.1	54.2	49.2	44.6	41.9	38.1	33.3	51.5
	(3)	PWL	70.6	70.6	77.4	76.7	74.3	69.0	66.2	64.5	57.3	75.8
S23UA/W	(1)	SPL	49.6	49.6	59.1	56.9	49.7	47.6	45.3	38.5	35.4	53.9
	(2)	SPL	50.5	50.5	59.6	57.1	51.0	47.7	45.4	40.7	36.0	54.4
	(3)	PWL	71.2	71.2	78.7	81.8	75.2	72.2	70.1	67.5	62.2	78.9
M25UA/W	(1)	SPL	51.5	51.5	50.1	54.0	50.1	47.1	46.1	38.8	36.5	53.1
	(2)	SPL	57.1	57.1	50.5	55.0	50.1	47.1	46.1	38.8	37.1	53.3
	(3)	PWL	72.2	72.2	75.1	78.9	70.8	69.0	66.9	62.2	58.5	75.4
M29UA/W	(1)	SPL	53.2	53.2	51.8	55.7	51.8	48.8	47.8	40.5	38.2	54.8
	(2)	SPL	59.0	59.0	52.4	56.9	52.0	48.8	47.8	40.5	39.0	55.1
	(3)	PWL	74.1	74.1	77.0	80.8	72.7	70.9	68.8	64.1	60.4	77.3
M31UA/W	(1)	SPL	53.5	53.5	56.4	62.3	54.2	52.3	49.4	44.1	36.6	58.4
	(2)	SPL	59.1	59.1	56.4	62.5	54.2	52.3	49.4	44.1	36.8	58.5
	(3)	PWL	55.2	56.0	70.1	75.0	69.0	72.7	71.8	67.0	61.7	77.4
M34UA/W	(1)	SPL	55.5	55.5	58.4	64.3	56.2	54.3	51.4	46.1	38.6	60.4
	(2)	SPL	61.2	61.2	58.5	64.6	56.2	54.3	51.4	46.1	38.9	60.5
	(3)	PWL	56.0	56.8	70.9	75.8	69.8	73.7	72.7	67.8	62.5	78.3
M35UA/W	(1)	SPL	56.2	57.0	71.1	76.0	70.0	73.8	72.8	68.0	62.7	60.4
	(2)	SPL	61.1	61.1	58.4	64.5	56.1	54.1	51.2	46.0	38.8	78.4
	(3)	PWL	55.3	55.3	58.2	64.1	56.0	54.1	51.2	45.9	38.4	60.2
M41UA/W	(1)	SPL	54.0	54.0	57.0	57.4	55.4	54.3	49.5	42.9	36.2	58.3
	(2)	SPL	65.4	65.4	58.1	57.6	55.4	54.3	49.5	42.9	36.2	58.4
	(3)	PWL	81.7	81.7	79.3	81.8	73.9	72.1	70.0	65.3	61.6	78.4
M42UA/W	(1)	SPL	53.6	53.6	56.6	57.0	55.0	53.9	49.1	42.5	35.8	57.9
	(2)	SPL	65.1	65.1	57.8	57.3	55.1	54.0	49.2	42.6	35.9	58.1
	(3)	PWL	82.1	82.1	79.7	82.2	74.3	72.5	70.4	65.7	62.0	78.8
M47UA/W	(1)	SPL	56.0	56.0	59.0	59.4	57.4	56.3	51.5	44.9	38.2	60.3
	(2)	SPL	67.4	67.4	60.1	59.6	57.4	56.3	51.5	44.9	38.2	60.4
	(3)	PWL	84.1	84.1	81.7	84.2	76.3	74.5	72.4	67.7	64.0	80.8
M50UA/W	(1)	SPL	54.8	54.8	57.8	58.2	56.2	55.1	50.3	43.7	37.0	59.1
	(2)	SPL	66.3	66.3	59.0	58.5	56.3	55.2	50.4	43.8	37.1	59.3
	(3)	PWL	84.1	84.1	81.7	84.2	76.3	74.5	72.4	67.7	64.0	80.8
M58UA/W	(1)	SPL	56.6	56.8	56.9	60.8	56.5	57.0	53.2	46.7	40.3	60.9
	(2)	SPL	69.1	69.3	57.2	60.8	56.7	57.1	53.4	46.7	40.4	61.1
	(3)	PWL	87.7	87.7	83.4	86.5	79.0	77.1	75.1	70.2	66.6	83.4
M66UA/W	(1)	SPL	63.4	62.4	62.3	65.9	58.0	57.9	55.6	47.8	43.3	63.2
	(2)	SPL	63.4	62.4	63.2	66.1	58.8	58.0	55.7	47.8	43.3	63.4
	(3)	PWL	77.1	77.1	85.8	88.5	81.4	78.9	76.8	72.1	68.4	85.3
L83UA/W	(1)	SPL	65.4	65.4	72.5	69.7	61.8	59.9	55.8	48.1	38.3	66.0
	(2)	SPL	65.6	65.6	72.6	69.8	62.1	60.1	56.1	48.6	40.1	66.2
	(3)	PWL	82.6	82.6	92.5	90.4	82.6	78.0	77.2	68.2	60.4	86.3
L99UA/W	(1)	SPL	66.1	66.1	73.2	70.4	62.5	60.6	56.5	48.8	39.0	66.7
	(2)	SPL	66.2	66.2	73.3	70.5	62.7	60.7	56.7	49.1	39.9	66.9
	(3)	PWL	82.7	82.7	92.6	90.5	82.7	78.1	77.3	68.3	60.5	86.4

Sound Pressure Level

Tab. 7b – F/D/H versions and Under configuration

MODEL	Mode	Level	Octave band frequency (Hz)									Sound Level [dB(A)]
			31.5	63	125	250	500	1000	2000	4000	8000	
S17UF/D/H	(1)	SPL	44.4	44.4	50.4	57.5	47.1	41.4	38.8	32.3	25.7	51.2
	(2)	SPL	45.1	45.1	51.2	57.6	47.7	41.5	38.9	34.4	27.0	51.4
	(3)	PWL	68.7	68.7	75.1	74.8	72.1	67.3	64.5	62.4	56.1	73.9
S20UF/D/H	(1)	SPL	48.1	48.1	52.5	54.7	48.9	45.3	42.6	36.4	33.3	51.7
	(2)	SPL	49.0	49.0	53.8	54.9	50.0	45.4	42.7	38.8	34.0	52.2
	(3)	PWL	68.2	68.2	76.5	78.8	72.0	69.2	67.1	64.7	59.3	75.9
S23UF/D/H	(1)	SPL	49.6	49.6	59.1	56.9	49.7	47.6	45.3	38.5	35.4	53.9
	(2)	SPL	50.4	50.4	59.5	57.1	50.9	47.7	45.4	40.6	36.0	54.4
	(3)	PWL	71.1	71.1	78.6	81.8	75.1	72.2	70.1	67.4	62.2	78.8
M25UF/D/H	(1)	SPL	53.1	53.1	51.7	55.6	51.7	48.7	47.7	40.4	38.1	54.7
	(2)	SPL	58.9	58.9	52.3	56.8	51.9	48.7	47.7	40.4	38.9	55.0
	(3)	PWL	74.2	74.2	76.9	80.9	72.4	70.6	68.5	63.8	60.5	77.1
M31UF/D/H	(1)	SPL	54.4	54.4	57.3	63.2	55.1	53.2	50.3	45.0	37.5	59.3
	(2)	SPL	60.3	60.3	57.6	63.7	55.3	53.2	50.4	45.2	38.0	59.6
	(3)	PWL	56.6	57.4	71.5	76.4	70.4	74.1	73.2	68.4	63.1	78.8
M34UF/D/H	(1)	SPL	55.9	55.9	58.8	64.7	56.6	54.7	51.8	46.5	39.0	60.8
	(2)	SPL	61.8	61.8	59.1	65.2	56.8	54.7	51.9	46.7	39.5	61.1
	(3)	PWL	56.8	57.6	71.7	76.6	70.6	74.3	73.4	68.6	63.3	79.0
M35UF/D/H	(1)	SPL	56.0	56.0	58.9	64.8	56.7	54.8	51.9	46.6	39.1	60.9
	(2)	SPL	61.9	61.9	59.2	65.3	56.9	54.8	52.0	46.8	39.6	61.2
	(3)	PWL	57.1	57.9	72.0	76.9	70.9	74.6	73.7	68.9	63.6	79.3
M41UF/D/H	(1)	SPL	54.7	54.7	57.7	58.1	56.1	55.0	50.2	43.6	36.9	59.0
	(2)	SPL	66.1	66.1	58.8	58.3	56.1	55.0	50.2	43.6	36.9	59.1
	(3)	PWL	82.4	82.4	80.0	82.5	74.6	72.8	70.7	66.0	62.3	79.1
M42UF/D/H	(1)	SPL	54.3	54.3	57.3	57.7	55.7	54.6	49.8	43.2	36.5	58.6
	(2)	SPL	66.0	66.0	58.7	58.2	56.0	54.9	50.1	43.5	36.8	59.0
	(3)	PWL	83.2	83.2	80.8	83.3	75.4	73.6	71.5	66.8	63.1	79.9
M47UF/D/H	(1)	SPL	56.2	56.2	59.2	59.6	57.6	56.5	51.7	45.1	38.4	60.5
	(2)	SPL	67.9	67.9	60.6	60.1	57.9	56.8	52.0	45.4	38.7	60.9
	(3)	PWL	84.9	84.9	82.5	85.0	77.1	75.3	73.2	68.5	64.8	81.6
M50UF/D/H	(1)	SPL	56.1	56.1	59.1	59.5	57.5	56.4	51.6	45.0	38.3	60.4
	(2)	SPL	67.8	67.8	60.5	60.0	57.8	56.7	51.9	45.3	38.6	60.8
	(3)	PWL	85.8	85.8	83.4	85.9	78.0	76.2	74.1	69.4	65.7	82.5
M58UF/D/H	(1)	SPL	58.3	58.5	58.6	62.5	58.2	58.7	54.9	48.4	42.0	62.6
	(2)	SPL	70.9	71.1	59.0	62.5	58.5	58.9	55.2	48.5	42.2	62.9
	(3)	PWL	89.6	89.6	85.3	88.2	80.9	79.0	77.0	72.1	68.5	85.2
L83UF/D/H	(1)	SPL	64.9	64.9	72.0	69.2	61.3	59.4	55.3	47.6	37.8	65.5
	(2)	SPL	65.1	65.1	72.1	69.3	61.6	59.6	55.6	48.1	39.6	65.7
	(3)	PWL	82.1	82.1	92.0	89.9	82.1	77.5	76.7	67.7	59.9	85.8

LEGENDA

The sound levels global and for each octave band are expressed in dB with a tolerance of (–0/+2) dB.

(1) *Only ventilation (20 Pa available external static pressure), 2 m in front of the unit and 1 m height, in free field conditions.*

(2) *Working compressor (20 Pa available external static pressure), 2 m in front of the unit and 1 m height, in free field conditions.*

(3) *Working compressor, on discharge side.*

Level

SPL *sound pressure level*

PWL*sound power level*

Sound Pressure Level

Tab. 7c — A/W versions, Over and Constant configurations

MODEL	Mode	Level	Octave band frequency (Hz)									Sound Level [dB(A)]
			31.5	63	125	250	500	1000	2000	4000	8000	
S04OA/W S04KA/W	(1)	SPL	44.4	44.4	48.6	44.0	42.9	37.9	34.1	27.5	17.8	44.0
	(2)	SPL	60.3	51.0	50.3	46.2	44.3	40.5	35.8	29.8	20.5	45.9
	(3)	PWL	75.6	66.3	64.3	64.5	60.5	58.6	56.0	54.0	49.0	64.2
S05OA/W S05KA/W	(1)	SPL	46.7	46.7	50.9	46.3	45.2	40.2	36.4	29.8	20.1	46.3
	(2)	SPL	58.8	51.3	51.9	47.6	46.0	41.8	37.4	31.2	21.7	47.4
	(3)	PWL	75.8	68.3	67.5	67.5	63.8	61.6	59.2	57.1	51.9	67.3
S07OA/W S07KA/W	(1)	SPL	48.5	48.5	52.7	48.1	47.0	42.0	38.2	31.6	21.9	48.1
	(2)	SPL	63.6	55.2	54.4	50.4	48.4	44.7	40.0	34.0	22.0	50.1
	(3)	PWL	79.4	71.0	68.8	69.1	65.0	63.2	60.6	58.7	51.0	68.7
S10OA/W S10KA/W	(1)	SPL	50.8	50.8	55.0	50.4	49.3	44.3	40.5	33.9	24.2	50.4
	(2)	SPL	61.9	54.8	55.8	51.5	49.9	45.6	41.3	35.0	25.6	51.3
	(3)	PWL	79.1	72.0	71.6	71.6	67.9	65.5	63.3	61.1	55.9	71.3
S12OA/W S12KA/W	(1)	SPL	52.8	52.8	57.0	52.4	51.3	46.3	42.5	35.9	26.2	52.4
	(2)	SPL	61.7	57.2	57.9	53.7	52.1	47.8	43.4	37.2	27.8	53.5
	(3)	PWL	78.3	73.8	73.2	73.3	69.6	67.2	64.9	62.7	57.6	73.0
S13OA/W S13KA/W	(1)	SPL	50.8	50.8	55.0	50.4	49.3	44.3	40.5	33.9	24.2	50.4
	(2)	SPL	59.3	55.0	55.9	51.6	50.0	45.7	41.4	35.1	25.7	51.4
	(3)	PWL	77.1	72.8	76.8	77.5	73.8	71.2	67.9	64.1	59.9	76.6
S17OA/W S17KA/W	(1)	SPL	52.1	52.1	56.3	51.7	50.6	45.6	41.8	35.2	25.5	51.7
	(2)	SPL	58.2	55.5	56.9	52.6	51.1	46.7	42.5	36.1	26.6	52.4
	(3)	PWL	75.8	73.1	77.6	78.3	74.7	72.0	68.8	64.9	60.6	77.4
S20OA/W S20KA/W	(1)	SPL	51.1	51.1	55.3	50.7	49.6	44.6	40.8	34.2	24.5	50.7
	(2)	SPL	60.4	57.2	56.8	52.7	50.8	46.9	42.3	36.3	27.0	52.4
	(3)	PWL	81.0	77.8	80.5	81.4	77.4	75.2	71.6	68.1	64.0	80.4
S23OA/W S23KA/W	(1)	SPL	54.3	54.3	58.5	54.5	51.8	48.4	45.0	38.9	29.1	54.0
	(2)	SPL	59.1	60.0	59.8	56.1	53.1	50.2	46.1	40.3	30.8	55.5
	(3)	PWL	77.1	78.0	82.5	86.2	78.2	77.9	75.1	70.7	68.3	83.4
M25OA/W M25KA/W	(1)	SPL	56.3	56.3	55.8	55.6	54.0	47.8	43.6	36.0	26.8	54.4
	(2)	SPL	58.5	57.7	55.8	55.6	54.0	49.0	44.9	39.9	33.5	55.0
	(3)	PWL	66.7	66.3	75.2	78.6	70.9	70.1	68.0	65.4	65.5	76.3
M29OA/W	(1)	SPL	58.2	58.2	57.7	57.5	55.9	49.7	45.5	37.9	28.7	56.3
	(2)	SPL	60.6	59.8	57.7	57.5	55.9	51.1	47.0	42.0	35.6	57.0
	(3)	PWL	67.0	66.6	75.5	78.9	71.2	70.4	68.3	65.7	65.8	76.6
M31OA/W	(1)	SPL	49.6	49.3	52.9	54.4	55.9	53.3	47.3	38.4	32.2	57.2
	(2)	SPL	61.5	60.7	57.3	56.6	55.9	53.3	47.9	42.9	36.5	57.7
	(3)	PWL	83.7	83.2	86.1	81.8	73.4	68.8	68.0	61.9	53.9	77.8
M34OA/W	(1)	SPL	51.8	51.5	55.1	56.6	58.1	55.5	49.5	40.6	34.4	59.4
	(2)	SPL	63.3	62.5	59.1	58.4	58.1	55.5	49.7	44.7	38.3	59.8
	(3)	PWL	85.2	84.7	87.6	83.3	75.3	70.7	69.9	63.4	55.4	79.5
M35OA/W	(1)	SPL	51.4	51.1	54.7	56.2	57.7	55.1	49.1	40.2	34.0	59.0
	(2)	SPL	63.8	63.0	59.6	58.9	58.1	55.1	50.2	45.2	38.8	59.8
	(3)	PWL	84.7	84.2	87.1	82.8	74.5	69.9	69.1	62.9	54.9	78.8
M41OA/W	(1)	SPL	62.5	57.4	61.4	57.0	55.8	54.5	49.0	42.5	38.4	58.5
	(2)	SPL	62.5	58.4	61.4	57.0	59.6	56.1	49.8	42.5	38.4	60.4
	(3)	PWL	70.7	70.7	79.6	83.0	77.6	74.6	72.4	67.7	65.0	80.8
M42OA/W	(1)	SPL	62.6	57.5	61.5	57.1	55.9	54.6	49.1	42.6	38.5	58.6
	(2)	SPL	62.6	58.2	61.5	57.1	59.4	55.9	49.6	42.6	38.5	60.3
	(3)	PWL	70.7	70.7	79.6	83.0	77.6	74.6	72.4	67.7	65.0	80.8
M47OA/W	(1)	SPL	63.3	58.2	62.2	57.8	56.6	55.3	49.8	43.3	39.2	59.3
	(2)	SPL	63.3	59.4	62.2	57.8	60.6	57.1	50.8	43.3	39.2	61.4
	(3)	PWL	71.9	71.9	80.8	84.2	78.6	75.7	73.6	68.9	66.2	81.9
M50OA/W	(1)	SPL	63.3	58.2	62.2	57.8	56.6	55.3	49.8	43.3	39.2	59.3
	(2)	SPL	63.3	59.7	62.2	57.8	60.9	57.4	51.1	43.3	39.2	61.7
	(3)	PWL	71.9	71.9	80.8	84.2	78.6	75.7	73.6	68.9	66.2	81.9
M58OA/W	(1)	SPL	65.0	59.9	63.9	59.5	58.3	57.0	51.5	45.0	40.9	61.0
	(2)	SPL	65.0	60.8	63.9	59.5	62.0	58.5	52.2	45.0	40.9	62.8
	(3)	PWL	73.5	73.5	82.4	85.8	79.9	77.3	75.2	70.5	67.8	83.4
M66OA/W	(1)	SPL	65.6	60.5	64.5	60.1	58.9	57.6	52.1	45.6	41.5	61.6
	(2)	SPL	65.6	61.1	64.5	60.1	62.3	58.8	52.5	45.6	41.5	63.2
	(3)	PWL	74.5	74.5	83.4	86.8	80.9	78.3	76.2	71.5	68.8	84.4

Sound Pressure Level

Tab. 7d – F/D/H versions, Over configuration

MODEL	Mode	Level	Octave band frequency (Hz)									Sound Level [dB(A)]
			31.5	63	125	250	500	1000	2000	4000	8000	
S17OF/D/H	(1)	SPL	52.6	52.6	56.8	52.2	51.1	46.1	42.3	35.7	26.0	52.2
	(2)	SPL	58.4	55.8	57.4	53.0	51.6	47.1	42.9	36.6	27.1	52.9
	(3)	PWL	75.8	73.2	77.9	78.5	75.0	72.2	69.0	65.2	60.9	77.7
S20OF/D/H	(1)	SPL	52.2	52.2	56.4	51.8	50.7	45.7	41.9	35.3	25.6	51.8
	(2)	SPL	61.2	58.1	57.8	53.7	51.9	47.9	43.3	37.3	27.9	53.4
	(3)	PWL	78.3	75.2	79.6	83.5	75.1	75.3	72.4	68.3	65.9	80.7
S23OF/D/H	(1)	SPL	54.9	54.9	59.1	55.1	52.4	49.0	45.6	39.5	29.7	54.6
	(2)	SPL	59.4	60.4	60.4	56.6	53.7	50.8	46.7	40.8	31.3	56.1
	(3)	PWL	76.8	77.8	82.5	86.1	78.2	77.9	75.1	70.6	68.2	83.4
M25OF/D/H	(1)	SPL	56.5	56.5	56.0	55.8	54.2	48.0	43.8	36.2	27.0	54.6
	(2)	SPL	60.4	59.6	56.2	55.8	54.7	50.9	46.8	41.8	35.4	56.2
	(3)	PWL	70.0	69.2	75.4	78.8	71.2	72.8	70.8	68.7	68.8	78.3
M31OF/D/H	(1)	SPL	49.7	49.4	53.0	54.5	56.0	53.4	47.4	38.5	32.3	57.3
	(2)	SPL	61.9	61.1	57.7	57.0	56.2	53.4	48.3	43.3	36.9	58.0
	(3)	PWL	84.3	83.8	86.7	82.4	73.5	68.9	68.1	62.5	54.5	78.2
M34OF/D/H	(1)	SPL	51.9	51.6	55.2	56.7	58.2	55.6	49.6	40.7	34.5	59.5
	(2)	SPL	64.3	63.5	60.1	59.4	58.6	55.6	50.7	45.7	39.3	60.3
	(3)	PWL	86.9	86.4	89.3	85.0	75.4	70.8	70.2	65.1	57.1	80.5
M35OF/D/H	(1)	SPL	51.5	51.2	54.8	56.3	57.8	55.2	49.2	40.3	34.1	59.1
	(2)	SPL	65.1	64.3	60.9	60.2	59.4	55.6	51.5	46.5	40.1	60.8
	(3)	PWL	87.0	86.5	89.4	85.1	75.0	70.0	70.3	65.2	57.2	80.5
M41OF/D/H	(1)	SPL	63.0	57.9	61.9	57.5	56.3	55.0	49.5	43.0	38.9	59.0
	(2)	SPL	63.0	59.1	61.9	57.5	60.3	56.8	50.5	43.0	38.9	61.1
	(3)	PWL	71.2	71.4	80.1	83.5	78.8	75.8	72.9	68.2	65.5	81.6
M42OF/D/H	(1)	SPL	63.0	57.9	61.9	57.5	56.3	55.0	49.5	43.0	38.9	59.0
	(2)	SPL	63.0	59.0	61.9	57.5	60.2	56.7	50.4	43.0	38.9	61.0
	(3)	PWL	71.1	71.4	80.0	83.4	78.8	75.8	72.9	68.1	65.4	81.6
M47OF/D/H	(1)	SPL	64.8	59.7	63.7	59.3	58.1	56.8	51.3	44.8	40.7	60.8
	(2)	SPL	64.8	60.5	63.7	59.3	61.7	58.2	51.9	44.8	40.7	62.5
	(3)	PWL	73.3	73.3	82.2	85.6	77.9	77.1	75.0	70.3	67.6	82.9
M50OF/D/H	(1)	SPL	64.7	59.6	63.6	59.2	58.0	56.7	51.2	44.7	40.6	60.7
	(2)	SPL	64.7	60.5	63.6	59.2	61.7	58.2	51.9	44.7	40.6	62.5
	(3)	PWL	73.4	73.4	82.3	85.7	78.0	77.2	75.1	70.4	67.7	83.0
M58OF/D/H	(1)	SPL	65.3	60.2	64.2	59.8	58.6	57.3	51.8	45.3	41.2	61.3
	(2)	SPL	65.3	60.9	64.2	59.8	62.1	58.6	52.3	45.3	41.2	63.0
	(3)	PWL	73.8	73.8	82.7	86.1	79.4	77.6	75.5	70.8	68.1	83.6

LEGENDA

The sound levels global and for each octave band are expressed in dB with a tolerance of (−0/+2) dB.

(1) *Only ventilation (50 Pa available external static pressure), 2 m in front of the unit and 1 m height, in free field conditions.*

(2) *Working compressor (50 Pa available external static pressure), 2 m in front of the unit and 1 m height, in free field conditions.*

(3) *Working compressor, on discharge side.*

Level

SPL *sound pressure level*

PWL*sound power level*

Sound Pressure Level

Tab. 7e — A/W versions and Displacement configuration

MODEL	Mode	Level	Octave band frequency (Hz)									Sound Level [dB(A)]
			31.5	63	125	250	500	1000	2000	4000	8000	
S04DA/W	(1)	SPL	46.6	46.6	49.3	42.7	40.0	40.7	34.9	24.9	18.1	44.1
	(2)	SPL	56.3	56.1	50.1	43.0	41.4	43.4	39.3	37.1	28.7	47.2
	(3)	PWL	67.4	67.2	60.4	59.6	57.5	54.7	54.7	59.9	51.9	63.9
S05DA/W	(1)	SPL	49.0	49.0	51.7	45.1	42.4	43.1	37.3	27.3	20.5	46.5
	(2)	SPL	54.9	55.7	52.1	45.3	43.1	44.6	39.9	36.5	28.2	48.3
	(3)	PWL	67.6	68.4	63.9	63.4	60.7	57.5	56.8	60.9	53.0	65.8
S07DA/W	(1)	SPL	53.8	53.8	56.5	49.9	47.2	47.9	42.1	32.1	25.3	51.3
	(2)	SPL	64.1	64.2	57.5	50.3	48.9	51.1	47.2	45.4	36.9	55.0
	(3)	PWL	72.6	72.7	65.1	64.2	62.3	59.7	59.9	65.6	57.5	69.3
S10DA/W	(1)	SPL	57.9	57.9	60.6	54.0	51.3	52.0	46.2	36.2	29.4	55.4
	(2)	SPL	62.8	65.4	61.1	54.2	52.2	53.8	49.3	46.3	37.9	57.5
	(3)	PWL	70.9	73.5	68.3	67.7	65.2	62.0	61.6	66.1	58.0	70.7
S12DA/W	(1)	SPL	58.5	58.5	61.2	54.6	51.9	52.6	46.8	36.8	30.0	56.0
	(2)	SPL	60.9	67.1	61.2	54.6	52.1	54.2	50.2	48.2	39.7	58.2
	(3)	PWL	69.8	76.0	69.3	69.0	66.0	63.3	63.4	68.8	60.7	72.7
S13DA/W	(1)	SPL	59.2	59.2	61.9	55.3	52.6	53.3	47.5	37.5	30.7	56.7
	(2)	SPL	59.4	66.1	62.3	55.5	53.3	54.8	50.2	47.0	38.6	58.5
	(3)	PWL	66.8	73.5	73.3	73.5	70.8	67.3	65.7	68.4	61.3	74.7
S17DA/W	(1)	SPL	60.0	60.0	62.7	56.1	53.4	54.1	48.3	38.3	31.5	57.5
	(2)	SPL	60.0	66.8	63.1	56.3	54.1	55.6	50.9	47.6	39.3	59.3
	(3)	PWL	67.7	74.5	74.4	74.6	71.9	68.4	66.7	69.3	62.3	75.7
S20DA/W	(1)	SPL	60.9	60.9	63.6	57.0	54.3	55.0	49.2	39.2	32.4	58.4
	(2)	SPL	60.9	66.0	63.8	57.1	54.7	55.9	50.9	46.5	38.3	59.5
	(3)	PWL	69.7	74.8	76.2	76.5	73.6	69.8	67.8	69.3	62.4	76.8
S23DA/W	(1)	SPL	63.8	63.8	66.5	59.9	57.2	57.9	52.1	42.1	35.3	61.3
	(2)	SPL	63.8	69.9	66.8	60.0	57.8	59.2	54.4	50.7	42.4	62.8
	(3)	PWL	70.3	76.4	78.5	81.7	74.5	73.4	72.3	73.9	68.7	80.7
M25DA/W	(1)	SPL	63.3	63.3	62.8	62.6	61.0	54.8	50.6	43.0	33.8	61.4
	(2)	SPL	65.6	64.8	62.8	62.6	61.0	56.1	52.0	47.0	40.6	62.0
	(3)	PWL	74.6	73.8	82.2	85.6	77.9	77.4	75.4	73.3	73.4	83.6
M29DA/W	(1)	SPL	65.5	65.5	65.0	64.8	63.2	57.0	52.8	45.2	36.0	63.6
	(2)	SPL	67.2	66.4	65.0	64.8	63.2	57.7	53.6	48.6	42.2	64.0
	(3)	PWL	74.4	73.6	82.5	85.9	78.2	77.4	75.3	73.1	73.2	83.6

LEGENDA

The sound levels global and for each octave band are expressed in dB with a tolerance of (−0/+2) dB.

(1) *Only ventilation (0 Pa available external static pressure), 2 m in front of the unit and 1 m height, in free field conditions.*

(2) *Working compressor (0 Pa available external static pressure), 2 m in front of the unit and 1 m height, in free field conditions.*

(3) *Working compressor, on discharge side.*

Level

SPL *sound pressure level*

PWL*sound power level*

Tab. 7f — A/W versions, Grille and Constant top frontal flow configurations

MODEL	Mode	Level	Octave band frequency (Hz)									Sound Level [dB(A)]
			31.5	63	125	250	500	1000	2000	4000	8000	
S04GA/W S04LA/W	(1)	SPL	60.2	60.2	57.2	47.8	46.2	43.5	36.6	31.1	20.2	48.7
	(2)	SPL	60.4	60.6	57.5	48.9	46.9	44.4	37.7	32.3	22	49.5
	(3)	PWL	59.9	60.1	61.9	62.4	58.8	54.9	53.4	50.9	46.1	61.5
S05GA/W S05LA/W	(1)	SPL	62.6	62.6	59.6	50.2	48.6	45.9	39	33.5	22.6	51.1
	(2)	SPL	62.6	62.8	59.7	50.7	48.9	46.3	39.5	34	23.4	51.4
	(3)	PWL	63.7	63.9	65.6	65.7	62.3	58.4	56.7	54.2	49.1	64.9

LEGENDA

The sound levels global and for each octave band are expressed in dB with a tolerance of (−0/+2) dB.

(1) *Only ventilation (0 Pa available external static pressure), 2 m in front of the unit and 1 m height, in free field conditions.*

(2) *Working compressor (0 Pa available external static pressure), 2 m in front of the unit and 1 m height, in free field conditions.*

(3) *Working compressor, on discharge side.*

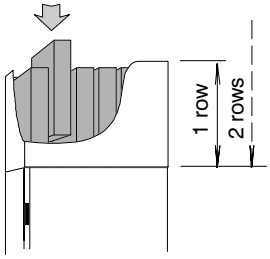
Level

SPL *sound pressure level*

PWL*sound power level*

Sound Pressure Level

Silencing cartridges (option)— for supply (Over) and suction (Under)



These are special cartridges made of self−extinguishing material with a high noise attenuation capacity. They are guaranteed against disintegration and release of particles do to friction of the air.

It is possible to install **one** or **two** rows of cartridges in the supply hood by inserting them through the top: one single row for $\geq$ 600 mm height hood, two rows for a hood height 1200 mm.
Despite a small additional pressure drop, these cartridges provide a remarkable sound power level reduction (see tab. 7d).

Tab. 7g — Features of silencing cartridges

Models	Dimensions	Free Section	Cartridge Number	
	[mm]	[mm]	1 row	2 rows
S04 — 05	500 x 195 x 500	400 x 100	1	2
S07 — 12	500 x 195 x 500	400 x 100	2	4
S13 — 23	500 x 195 x 500	400 x 100	4	8
M25 — M29	500 x 195 x 500	400 x 100	5	10
M31...M77	500 x 195 x 500	400 x 100	11	22
L83	500 x 195 x 500	400 x 100	16	32
L99	500 x 195 x 500	400 x 100	16	32

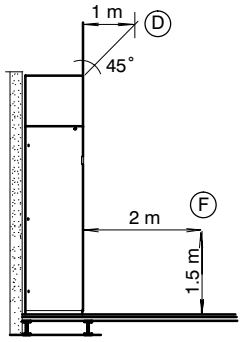
Tab. 7h — Attenuation in dB

row no.	Attenuation in dB at different frequency values (Hz)							
	63	125	250	500	1000	2000	4000	8000
1	1	4	7	15	26	28	27	14
2	1	6	12	27	49	53	49	23

Tab. 7i — Pressure drops

row no.	Pressure drops (Pa) for each module at different air flows (m^3/s)				
	0.2	0.3	0.4	0.5	0.6
1	1	2	4	7	9
2	3	6	11	18	26

Tab. 7j — Approximate variations of Sound Pressure Level



Variations compared to values measured without noise reduction duct: free discharge (for Over units) or free suction (Under units).

Position **F**: 2 meters from the front, 1.5 meter from the ground

Position **D**: 1 meter from the front, 45° from the top

Unit Configuration	Plenum Height	Cartridge Rows Number	Position	
			F	D
Under	600 mm	1	−4.0 dB	−7.0 dB
	1200 mm	2	−5.0 dB	−8.0 dB
Over	600 mm	1	−7.5 dB	−12.0 dB
	1200 mm	2	−9.5 dB	−14.0 dB

8 Technical Specifications

Fan (room unit)

Innovative application of single inlet centrifugal fans incorporating an impeller with curved blades corrosion resistant made of aluminium with new design to get increased performances and sound radiation free of tonal noise.
High efficiency.
The motor is three–phase (single phase on units S04xx – S12xx) with IP54 protection; provided with internal thermal protection.
The fan wheel is statically and dynamically balanced; the bearings are self–lubricating.
The fan is mounted on anti–vibration rubber supports to reduce the mechanical contact with the frame and hence minimize vibration.
Available head up to 350 Pa.
Modularity.
Variable speed: autotransformer with several different settings; possibility to optimize air flow, available head, dehumidification operation.
Other information: see **Chap. 1**.

Air filters (see Chap. 9)

Compressor

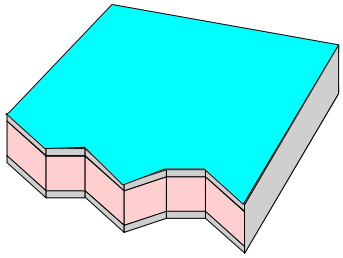
SCROLL compressors
High COP (Coefficient Of Performance)
High MTBF (Mean Time Between Failure)
Low sound level.
Vibration–damped.
Provided with internal thermal protection.
Low pickup current (equalization of the internal pressures).

Coils

DX Refrigerant/room air

High front surface.
Made of copper pipes and aluminium fins.
Fins treated with hydrofile styrol acrylic paints to withstand corrosive atmospheres.
Low pressure drop.
High SHR (Sensible Heat Ratio).

Frame and panels



The sheet steel structure, painted with CHARCOAL GREY epoxy–polyester powders, is assembled by stainless steel rivets; the paneling system ensures higher stiffness; there will also be some pluggings (compressor space and fan) for guaranteeing both safety and high acoustic absorption.
The frontal panel is assembled on hinges to make the access easier; this can be opened by the fast closing lock.
The rear and side panels are screwed to the supports. The rear panel is screwed directly to the frame.
The air returns from the machine top in machines with underfloor air delivery, whereas in machines with upward air delivery it returns through the metal grid on the front panel.
The compressor section can be reached even during the unit operation by removing the front panel and the protection plugging.
The panels are lined with thermoacoustic insulating material – class 0 (ISO 11822).

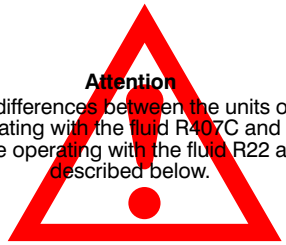
Refrigerant

The units are designed for being used with refrigerant R407C.

Technical notes R407C

ATTENTION the differences between units operating with refrigerant fluid R407C and those operating with fluid R22 are described below.

It has been proven that the chlorine inside some refrigerants (HCFC and above all CFC) is harmful for the atmosphere ozone layer.
The Montreal protocol, with the following amendments (London 1990, Copenhagen '92, Vienna '95, Montreal '97, Peking '99) and the new European regulation no. 2037/2000, in force since 1st October 2000, limit in time, with several expiry dates, the production and use of the HCFC refrigerants, among which R22.



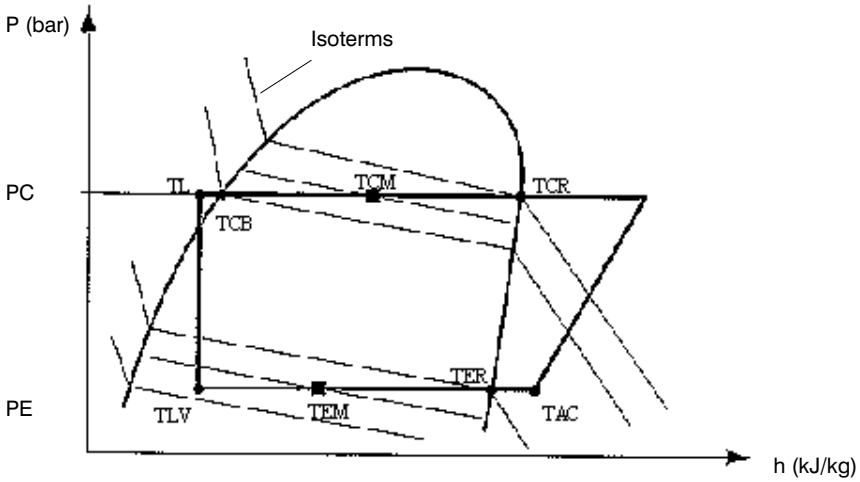
The refrigerant R407C (HFC) does not contain chlorine and is thus absolutely suitable for the use in air conditioning systems, without damaging the ozone layer. Its main features are:

- Non−azeotropic mixture made of R32/R125/R134a in which the percentage weight composition is, in ratio, 23/25/52.
- Thermophysical features similar to R22.
- ODP (Ozone Depletion Potential) equal to 0.
- Not flammable in the air.
- Low toxicity.

The new HFC fluids are essentially incompatible with the mineral oils which are usually used with R12 and R22.

Therefore, new synthetic lubricants based on polyester molecules have been developed for their use.

Note: Considering the unique thermophysical properties of RC407C the refrigeration cycle is illustrated in the diagram below.



High pressure side

TCB: condensation temperature bubble point (Liquid)
TCR: condensation temperature dew point (Vapor)
TCM: average condensation temperature (TCB+TCM)/2
TL: temperature of the refrigerant at the expansion valve inlet
Overheating = TAC − TER

Low pressure side

TLV: liquid−steam temperature
TER: evaporation temperature dew point (Vapor)
TEM: average evaporation temperature (TLV+TER)/2
TAC: temperature of the overheated vapour at the compressor inlet
Sub−cooling = TCB −TL

Humidifier (option) see Chap. 11

Electrical Heaters (option) for Heating Mode

The heaters are made of:

– armored stainless steel AISI 304 for **S04–S05**

– aluminium with high efficiency fins for all **other S and L models**

– finned armored stainless steel AISI 304 for **M models**:

to maintain a low surfaces power density. Ionization effects are eliminated owing to the low heater surface temperature. Each stage of electric heating is distributed across the three phases so to avoid balancing problems.

There an ON–OFF type electronic temperature controller, a safety thermostat with manual reset, a miniature circuit breaker for short–circuit protection and harness protection from possible accidental contact.

When electrical heating is installed, the dehumidification system can be also activated and humidity sensor and indicator provided, if especially ordered (see "humidification and dehumidification system" for the dehumidification function). Electric heating can be installed combined with hot gas or hot water heating.

Hot Gas Coil (option)

DX units for Reheating Mode only (versions A/W/F/D/H)

Liebert Hiross HPM can be supplied with a reheating system that uses the heat which is normally transferred to the condenser, thus saving energy.

This system is activated during the dehumidification phase, when the temperature is below its setpoint. A control valve prevents the refrigerant from flowing into the reheat coil when not required. Hot gas reheat is available as an alternative to hot water reheat.

Tab. 8a – Features of hot gas reheat system at nominal airflow

MODELS U/O A/W/F/D/H		S04	S05	S07	S10	S12	S13	S17	S20	S23
rows	no.	1	1	2	2	2	1	1	1	1
surface	m^2	0.17	0.17	0.15	0.15	0.15	0.37	0.37	0.37	0.37
reheating capacity (at 24°C, 50%, condensing temperature 45°C)	kW	2.8	3.4	5.0	6.3	7.5	8.4	10.1	12.0	15.6

MODELS U/O A/W/F/D/H		M25	M29	M31	M34	M35	M41	M42	M47	M50	M58	M66
rows	no.	1	1	1	1	1	1	1	1	1	1	1
surface	m2	0.47	0.47	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
reheating capacity (at 24°C, 50%, condensing temperature 45°C)	kW	15.4	17.6	18.4	10.5	21.6	26.8	12.4	31.6	16	17.8	20.7

MODELS U A/W/F/D/H		L83	L99
rows	no.	1	1
surface	m2	1.29	1.29
reheating capacity (at 24°C, 50%, condensing temperature 45°C)	kW	29.2	35.4

Tab. 8b – Reheating mode during the dehumidifications

Hot gas reheat (HG) + Heaters (H1, H2) during Dehumidification mode			
	ON	OFF	Functions
first step	HG + H1	=	Reheating + Heater
second step	HG + H2	HG + H1	Reheating + Heater

Technical Specifications

Hot Water Coil (for heating and reheating mode and dehumidification system)

The hot water heating coil is made of copper pipes and aluminium fins, with one row, test pressure 30 bar and includes an exhaust valve. A three−way on−off valve directly driven by the microprocessor controller is supplied as standard.
A hot water thermostat (provided by the customer) is installed to indicate the presence of hot water at the correct temperature. When hot water heating is installed, the dehumidification system can also activated and a humidity sensor and indicator provided, if especially ordered (see "humidification and dehumidification system" for the dehumidification function).
The hot water heating/reheat system can be installed as an alternative to the hot gas reheat system.

Tab. 8c − Features of hot water reheat system at nominal airflow

MODELS U/O A/W/F/D/H		S04	S05	S07	S10	S12	S13	S17	S20	S23
rows	no.	1	1	2	2	2	1	1	1	1
surface	m^2	0.17	0.17	0.15	0.15	0.15	0.37	0.37	0.37	0.37
indoor temp. 24°C, 50% R.H.; water inlet/outlet temperature 80/65°C; condensing temperature 45°C										
power (re−heating)	kW	2.7	3.0	5.8	6.7	7.0	10.3	11.4	12.1	13.2
water flow	l/s	0.04	0.05	0.10	0.11	0.11	0.17	0.19	0.20	0.22
coil side pressure drops	kPa	1	1	1	1	1	1	1	1	1
total pressure drops	kPa	2	2	2	2	2	4	5	5	3
indoor temp. 20°C, 50% R.H.; water inlet/outlet temperature 80/65°C; condensing temperature 45°C										
power (re−heating)	kW	2.8	3.2	6.2	7.2	7.4	11.1	12.3	13.1	14.2
water flow	l/s	0.05	0.05	0.10	0.12	0.12	0.18	0.20	0.21	0.29
coil side pressure drops	kPa	1	1	1	1	1	1	1	1	1
total pressure drops	kPa	2	2	2	2	3	4	5	6	3

MODELS U/O A/W/F/D/H		M25	M29	M31	M34	M35	M41	M42	M47	M50	M58	M66
rows	no.	1	1	1	1	1	1	1	1	1	1	1
surface	m^2	0.47	0.47	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
indoor temp. 24°C, 50% R.H.; water inlet/outlet temperature 80/65°C; condensing temperature 45°C												
power (re−heating)	kW	16.3	17.4	32.5	34.2	34.5	38.4	38.3	40.8	40.8	42.3	43.9
water flow	l/s	0.265	0.283	0.530	0.558	0.563	0.627	0.625	0.665	0.666	0.690	0.716
coil side pressure drops	kPa	1	1	2	2	2	3	3	3	3	3	4
total pressure drops	kPa	4	4	14	15	15	19	19	21	22	22	25
indoor temp. 20°C, 50% R.H.; water inlet/outlet temperature 80/65°C; condensing temperature 45°C												
power (re−heating)	kW	17.4	18.6	34.6	36.4	36.7	40.8	40.7	43.3	43.3	44.8	46.5
water flow	l/s	0.284	0.303	0.564	0.593	0.598	0.665	0.663	0.705	0.706	0.731	0.759
coil side pressure drops	kPa	1	1	2	3	3	3	3	3	3	4	4
total pressure drops	kPa	4	5	15	18	18	22	21	24	24	26	28

MODELS U A/W/F/D/H		L83	L99
rows	no.	1	1
surface	m^2	1.29	1.29
indoor temp. 24°C, 50% R.H.; water inlet/outlet temperature 80/65°C; condensing temperature 45°C			
power (re−heating)	kW	32.2	33.7
water flow	l/s	0.525	0.550
coil side pressure drops	kPa	5	6
total pressure drops	kPa	10	11
indoor temp. 20°C, 50% R.H.; water inlet/outlet temperature 80/65°C; condensing temperature 45°C			
power (re−heating)	kW	34.1	35.7
water flow	l/s	0.556	0.582
coil side pressure drops	kPa	6	6
total pressure drops	kPa	11	12

Technical Specifications

Tab. 8d — Reheating mode during the dehumidifications

Hot water reheat (HW) + Heaters (H1, H2) during Dehumidification mode			
	ON	**OFF**	**Functions**
first step	HW + H1	=	Reheating + Heater
second step	HW + H2	HW + H1	Reheating + Heater

Tab. 8e — Features of hot water heating system at nominal airflow

MODELS U/O A/W/F/D/H		**S04**	**S05**	**S07**	**S10**	**S12**	**S13**	**S17**	**S20**	**S23**
rows	no.	1	1	2	2	2	1	1	1	1
surface	m^2	0.17	0.17	0.15	0.15	0.15	0.37	0.37	0.37	0.37
indoor temp. 24°C, 50% R.H.; water inlet/outlet temperature 80/65°C.										
power (heating)	kW	2.0	2.3	4.6	5.2	5.4	7.7	8.6	8.9	9.5
water flow	l/s	0.03	0.04	0.07	0.09	0.10	0.13	0.14	0.15	0.15
coil side pressure drops	kPa	1	1	1	1	1	1	1	1	1
total pressure drops	kPa	2	2	2	2	2	3	3	3	2
indoor temp. 20°C, 50% R.H.; water inlet/outlet temperature 80/65°C.										
power (heating)	kW	2.3	2.5	5.0	5.7	5.9	8.8	9.7	10.1	10.7
water flow	l/s	0.04	0.04	0.08	0.09	0.10	0.14	0.16	0.16	0.18
coil side pressure drops	kPa	1	1	1	1	1	1	1	1	1
total pressure drops	kPa	2	2	2	2	2	3	4	4	2

MODELS U/O A/W/F/D/H		**M25**	**M29**	**M31**	**M34**	**M35**	**M41**	**M42**	**M47**	**M50**	**M58**	**M66**
rows	no.	1	1	1	1	1	1	1	1	1	1	1
surface	m^2	0.47	0.47	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
indoor temp. 24°C, 50% R.H.; water inlet/outlet temperature 80/65°C.												
power (heating)	kW	12.4	13.2	26.2	27.3	27.4	30.2	30.5	31.8	31.8	32.8	33.7
water flow	l/s	0.202	0.215	0.427	0.446	0.447	0.493	0.497	0.519	0.519	0.536	0.549
coil side pressure drops	kPa	1	1	1	2	2	2	2	2	2	2	2
total pressure drops	kPa	3	3	9	10	10	12	12	13	13	14	15
indoor temp. 20°C, 50% R.H.; water inlet/outlet temperature 80/65°C.												
power (heating)	kW	13.7	14.7	28.7	29.9	30.0	33.1	33.3	34.8	34.8	35.9	36.8
water flow	l/s	0.224	0.239	0.467	0.488	0.489	0.540	0.544	0.568	0.568	0.586	0.601
coil side pressure drops	kPa	1	1	2	2	2	2	2	2	2	2	3
total pressure drops	kPa	3	3	11	12	12	14	14	15	15	16	18

MODELS U A/W/F/D/H		**L83**	**L99**
rows	no.	1	1
surface	m^2	1.29	1.29
indoor temp. 24°C, 50% R.H.; water inlet/outlet temperature 80/65°C.			
power (heating)	kW	25.4	26.2
water flow	l/s	0.415	0.428
coil side pressure drops	kPa	3	4
total pressure drops	kPa	6	7
indoor temp. 20°C, 50% R.H.; water inlet/outlet temperature 80/65°C.			
power (heating)	kW	27.9	28.6
water flow	l/s	0.455	0.467
coil side pressure drops	kPa	4	4
total pressure drops	kPa	8	8

Water—cooled Condenser

DX — W/F/H units (see Chap. 5)

Electric board

The electric board is housed in the front part in a space insulated against the air flow and protected by a plastic crankcase, so as to avoid tampering by non—authorized personnel and to protect the electric board parts supplied with a voltage higher than 24 V.

The electric board complies with the norm 204—1 IEC.
The air conditioners have been provided for operating at 400 V~/3/50 Hz+N+G (as special alternative execution, the version with 220~V/3/50Hz + G can be supplied) and at 380 V~/3/60 Hz+N+G and 230V ~/3/60 Hz+G.

Magnetothermal switches are supplied as protection of every electric component. A single—phase transformer has been provided for supplying power to the secondary circuit at 24 V.

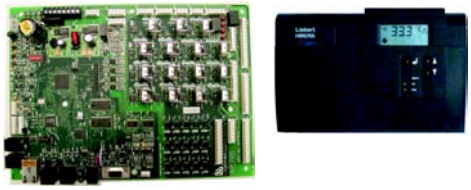
A main switch with door—locking handle is installed in series on the safety crankcase to prevent it from being removed when the switch is in the operating position.

There will be an automatic start—up after a possible stop due to power supply lack.
Additional terminals for remote start—up and carry of some operating conditions (fans and compressors) or connection of additional devices (Liquistat, Firestat, Smokestat, clogged filters) are set in series on the terminal board of the electric board. On the terminal board there is also a clean contact for the remote signalling of the general alarm.

Control system

Fig. 8.b iCom Medium (S & M models only)

Fig. 8.a iCom Large (L model only)



Very simple user interface.

Immediately intelligible utilization of the control unit system with LCD.

Net connectivity of several units.

Possible utilization of the iCom Large CDL with graphic display.

Outdoor Components

Air—cooled Condenser

DX — A/D units (see Product Documentation of HCE condenser)
For pipe layout and unit connection, see Chap. 12 and Service Manual in the unit (or surfed on the web).

Dry—Cooler

DX — W/F/H units

9 Filter section

Standard filters

Removable filters installed inside the unit before of fan and heat exchanger.

Filtration from G4 to F5 (CN EN779 – respectively corresponding to EU4 and EU5 accoding to Eurovent EU4/5).

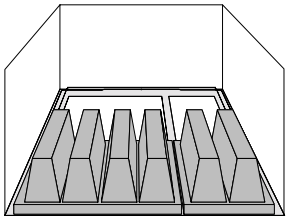
The folded structure of the filters gives high filtration efficiency and low pressure drop.

The filter media used consists of synthetic fibre cells. The frame is made of cardboard.
The additional pressure drop in comparison with G4 sdt filters are indicated in Tab. 9c.

High efficiency filters

Optional high efficiency filters, filtration class F6, F7 and F9 in accordance with the CEN EN 779 standard, are made of fibreglass filter media. The filters are placed in "V" sections with a solid external frame in polypropylene, and can withstand remarkable pressure and flow variations. These filters will be installed within an additional duct on the unit top.

Filter holding duct



If 290 mm high filters are needed, a metal hood must be supplied to support them, installed on the top of the unit and with the same colour. For dimensions see Fig. 12.d.

Clogged filter alarm

A differential static pressure gauge after anf before the filter gives a signal when the filter is dirty.

Fresh air kit

The fresh air kit, optional, has a G3 class filter installed on the intake side of the fan and is connected to the Liebert Hiross HPM unit with a 100 mm diameter plastic duct.
As the fresh air intake is positioned close to the fan suction, it will easily mix with the recirculation air.

Air Filters general information

Recently new test methods and configuration systems have been developed for all type of filters. In Europe, CEN is working to establish common standards, in the United States ASHRAE Standards has been in use since 1968, and replaced by ANSI/ASHRAE 52.1–1992. So, in order to have a reference about different standards, see Tab. 9a and Tab 9b. There is no perfect correspondence between different standards, due to the different test methods, but the tables can be used as general guide.

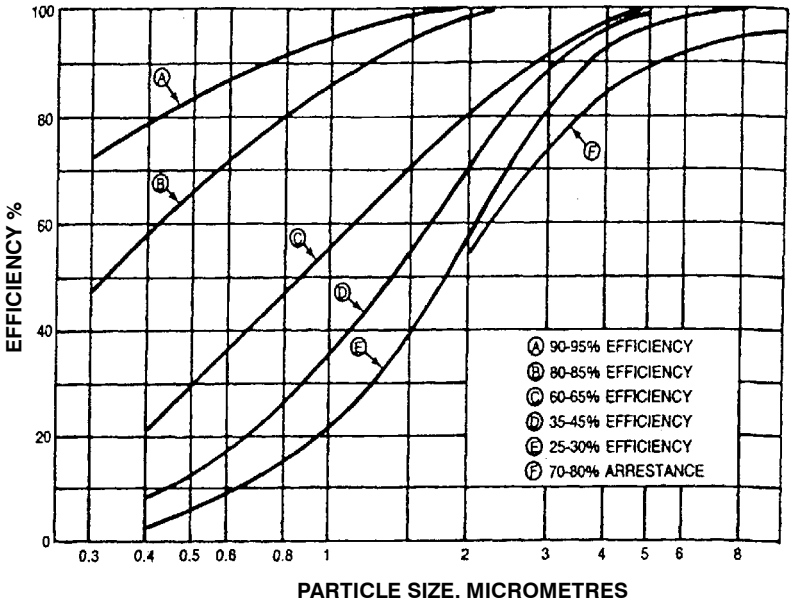
Tab. 9a – Comparison between air filter tests

Eurovent 4/9	EN 779 EN 1882	Average Arrestance * [ASHRAE Standard 52.1–1992]		Average Dust Spot Efficiency ** [ASHRAE Standard 52.1–1992]		Minimum Efficiency Reporting Value [ASHRAE 52.2–1999]
		[greater then or equal to]	[less than]	[greater than or equal to]	[less than]	
EU1	G1	60%	65%		20%	1–4
EU2	G2	65%	80%	20%		4
EU3	G3	80%	90%	20%		5
EU4	G4	90%	95%	20%	30%	6–7–8
EU5	F5	95%	98%	40%	60%	8–9–10
EU6	F6	99%		60%	80%	10–11–12–13
EU7	F7	99%		80%	90%	13–14
EU8	F8	99%		90%	95%	14–15
EU9	F9	99%		95%		15

* *Achieved filtering performance in accordance to gravimetric test method on a specific sample of dust.*
** *Achieved filtering performance in accordance to a light transmission test methods, with natural atmospheric dust.*

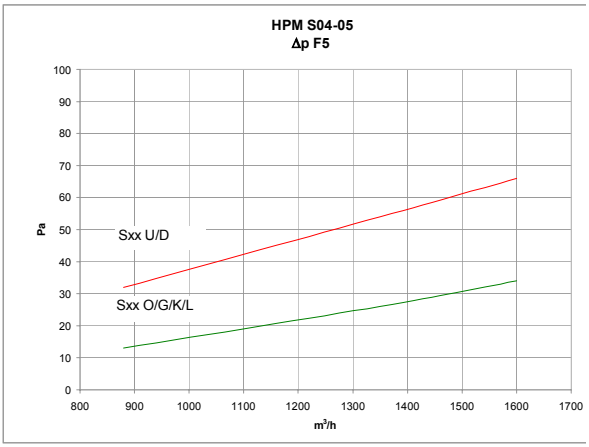
Filter section

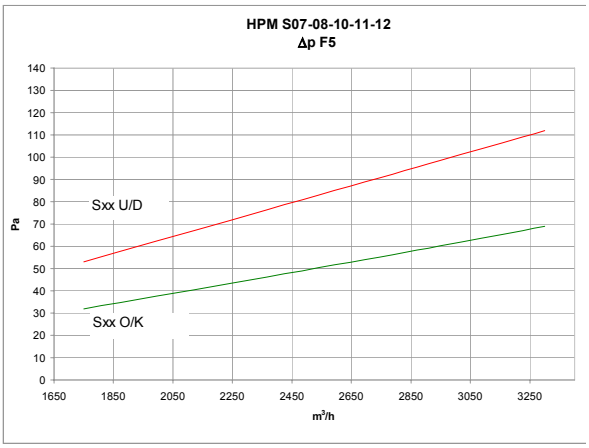
Tab. 9b – Approximate efficiency versus particle size for typical air filters

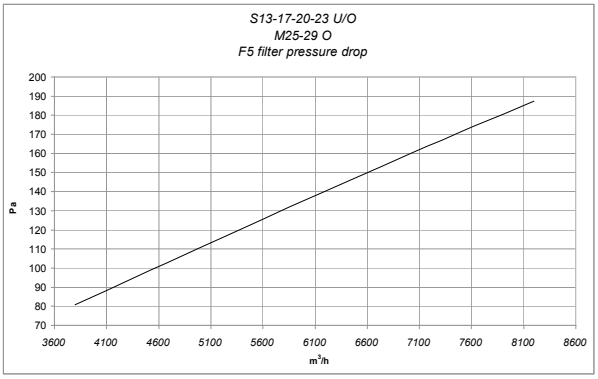


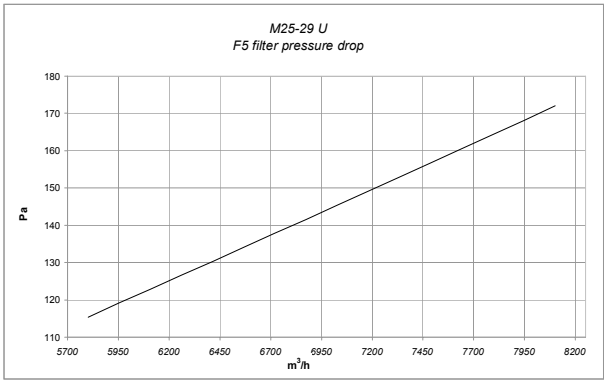
Curves are approximation for general guidance only. Efficiency and arrestance per ASHRAE Std 52.1 test method [From ASHRAE Handbook, HVAC Systems and Equipment].

Tab. 9c – Additional pressure drop Filters F5

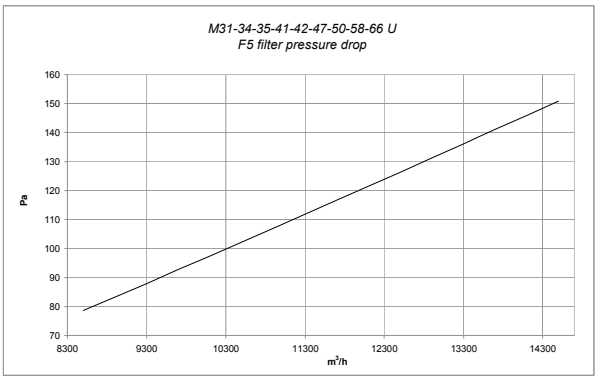


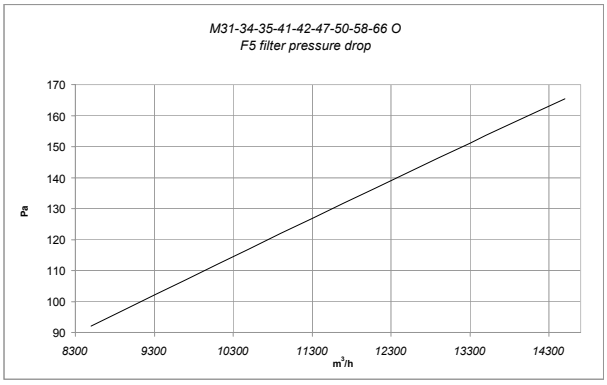


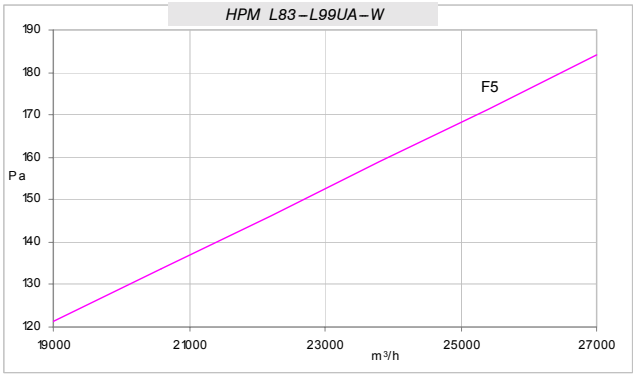




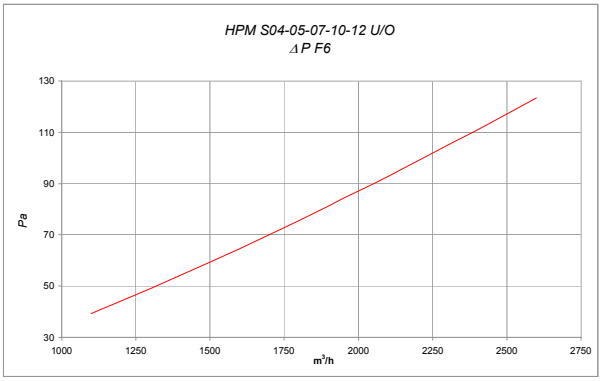
Filter section

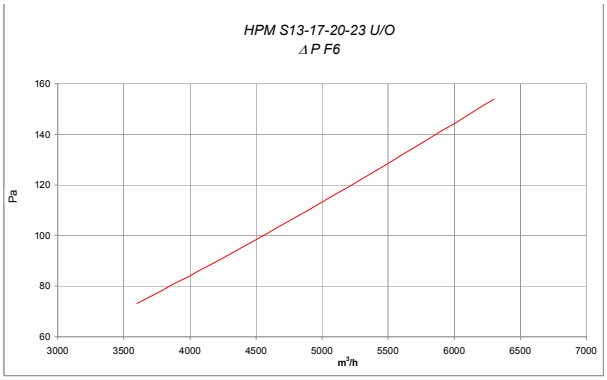




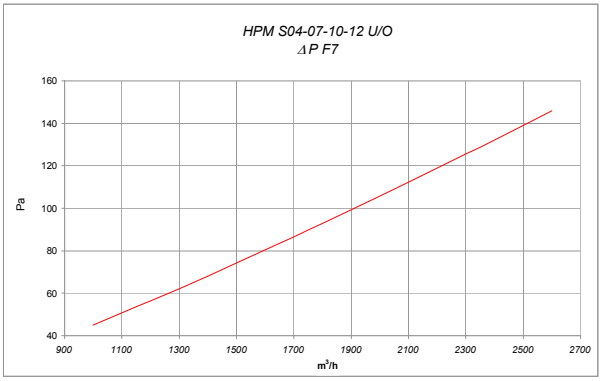


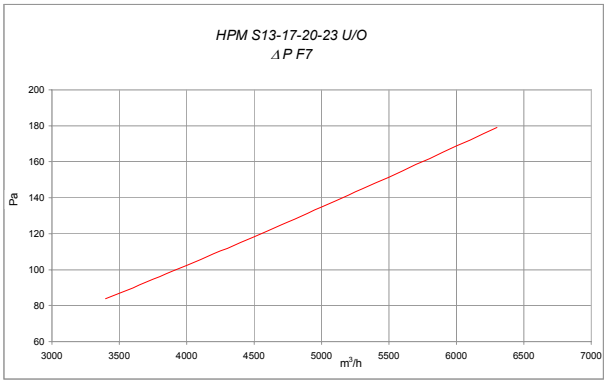
Tab. 9d – Additional pressure drop Filters F6





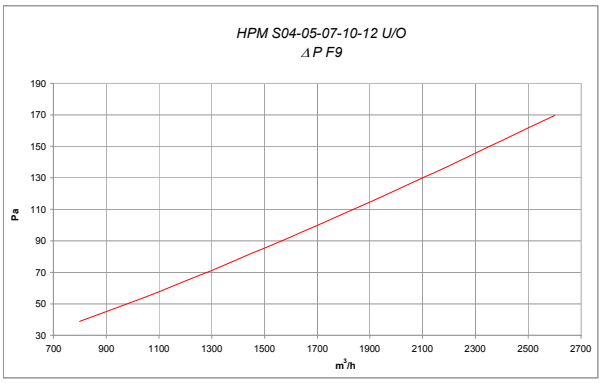
Tab. 9e – Additional pressure drop Filters F7

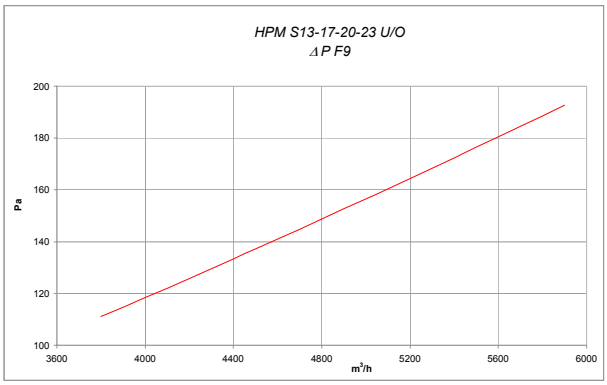




Filter section

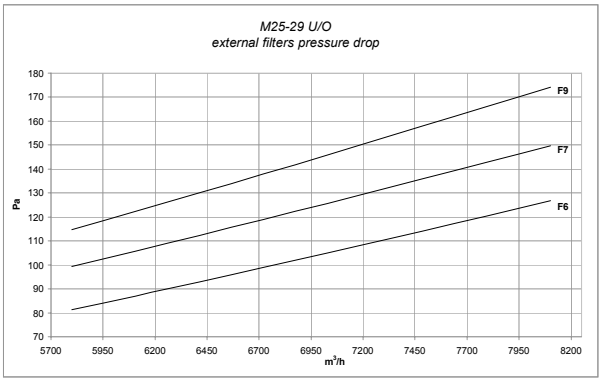
Tab. 9f – Additional pressure drop Filters F9

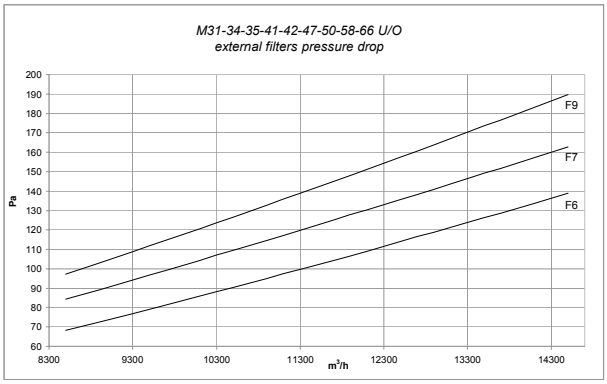




Tab. 9g – Additional pressure drop Filters F6–F7

Tab. 9h – Additional pressure drop Filters F6–F7–F9





10 Microprocessor Controls

iCom Control

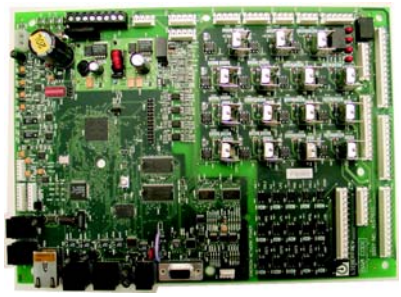
Fig. 10.a

Liebert Hiross HPM models are controlled by iCom:

- iCom Medium, for single circuit units (Fig. 10.a).
- iCom Large, for double circuit units (Fig. 10.b).

In both versions the Main Board is housed in the electrical panel and it is connected to the remote display, to be installed in the container/room .(connection cable is included)

Fig. 10.b



- The user interface is the 3−digit back−lit display showing parameter values and relevant symbols/codes in a tree menu. It features navigation push−buttons and status leds.
- Both high and low priority alarms activate a visual indicator and buzzer.
- Input for Remote On−Off and volt−free contacts for simple remote monitoring of low and high priority alarms: high/low room temperature, high/low refrigerant pressure, fan/control failure are available.

- LAN management: functions provided as standard include stand−by (in case of failure or overload of the unit in operation, the second one starts automatically), automatic rotation, and cascade (division of the load among several units, through split of the proportional band).
- The self−test function automatically activates/deactivates the main components (evaporator fan, compressor, freecooling damper, heaters, alarms) without changing the pre−set parameters, to easily start−up and commission the unit. No skilled personnel are requested (*).
- All settings are protected through a 3−Level password system (*).
- Automatic restart is provided after a power failure.

(*) *The Remote display is required to activate the function.*

Tab. 10a − Technical Data iCom

Technical Data	iCom Medium	iCom Large
E2prom	4Mbit + 512kbit	
Flash memory	32Mbit	
RAM memory space	128Mbit	
Microcontroller	Coldfire 32Mbit	
Analogue Input	3 x 0−10V,0−5V,4..20mA (selectable) + 2 PTC/NTC + 3 NTC	4 x 0−10V,0−5V,4..20mA (selectable) + 2 PTC/NTC + 2 NTC
Digital Input	9 x opto−coupled	15 x opto−coupled
Analogue Output	2 x 0−10V	4 x 0−10V
Digital Output	7 triacs output and 2 relay output	15 triacs output and 2 relay output
Time and date function buffered by LI−battery		
Hirobus Lan connectors	2 RJ45 sockets (for unit in LAN, remote display)	
Ethernet network connectors	1 RJ45 socket	
CAN bus connectors	2 RJ12 sockets	
Hironet connectors	1 RJ10 socket for RS485 (direct connection to proprietary supervision)	
RS232 service port	−	1 db9 socket

Microprocessor Controls

CDL Graphic Display (option)

Featuring a 24h graphic record of controlled parameters as well as the last 200 events occurred. A back–up battery keeps the data stored in the memory (graphic data record, alarms).

- Large graphic display (320 x 240 pixel)
- System Window: system operation status at a glance
- Self–explanatory Icons: they are used for the Menu–Layout of the CDL iCom
- Online Help: Every single parameter has its own multi–page explanation (Evolution)
- Status Report of the latest 200 event–messages of the unit/system
- Four different Graphic Data Records (Evolution)
- Timer Mode (electronic timer included in the Software)
- Semi or Full Manual Mode software management including all safety devices
- 4–Level Passwords system to protect all the settings
- Ergonomic design for use also as portable device (start–up and ”flying connections” by service personnel)
- Multi–language menu with on–the–fly language selection

Technical Data CDL Graphic Display

- Microcontroller: . . . . . Coldfire 32Mbit
- Time and date function buffered by LI–battery
- Ethernet network connectors . . . . . 2 RJ45 sockets (for unit in LAN, remote display)
- CAN bus connectors . . . . . 2 RJ12 sockets
- Power supply: . . . . . via CAN bus or external 12Vdc supply

Alarm Board (accessory)

The Alarm Board converts Alarms (high priority) or Warnings (lower priority) from iCom into Volt–free contacts (up to five, either normally closed or normally open). In this way, following Warnings/Alarms are separated: High or Low refrigerant pressure; High room Temperature; Low room Temperature; Fan Failure, Clogged Filter alarm (if installed).

SMM, Wireless SMS Communication (accessory)

The unit is able to send short text messages (SMS) of the its status/alarms to the display of GSM900–1800MHz mobile phones, allowing real time, cost effective maintenance.

11 Humidair humidifier

Humidification

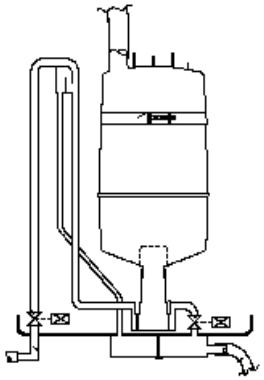
The **humidification system** is provided by a HUMIDAIR electronic humidifier. The **dehumidification function**, which is supplied as standard when the humidifier option is installed, acts by reducing the fan speed with consequent reduction of the air flow and at the same time switching on the compressor.

Electronic humidity control

The software of the iCom microprocessor control includes an algorithm which manages the HUMIDAIR electronic modulating humidifier and also provides the dehumidification function. There is also a special function which automatically prevents dehumidification if the return air temperature is below the required value. When the temperature reaches the correct value, the dehumidification function is automatically reactivated. Dehumidification control may be either of the proportional or of the on−off type, depending on the installation requirements: on−off is set as standard at the factory.

HUMIDAIR electric steam humidifier

HUMIDAIR is a replaceable plastic water cylinder with immersed electrodes. When an electronic current passes between the electrodes, the water is converted into the required quantity of steam. It is suitable for a large range of water qualities (with varying degrees of hardness) with the exception of demineralized water. It almost instantaneously produces clean, particle−free steam and avoids energy losses which are typical of other systems. HUMIDAIR is provided with the steam cylinder, water inlet and outlet valves and a maximum level sensor. The steam output can be adjusted within a range of values which can be chosen manually and is factory−set at 70% of the maximum capacity (see the relevant data).



Humidifier features

The steam is mixed with the delivery air of the evaporating coil by means of a suitable distributor. The iCom controller can determine when the cylinder has to be changed. Replacing the cylinder is extremely easy and quick. A self−adaptive flow control system is fitted as standard and controls the current passing through the cylinder water.

Humidair humidifier

Tab. 11a — Humidair specifications

HPM MODEL	HUMIDAIR MODEL	MAIN POWER SUPPLIES (V ± 10%)	SETTING	ABSORBED CURRENT	POWER	MAX. CYLINDER WATER VOLUME	MAX. SUPPLY WATER QUANTITY	MAX. DRAIN WATER QUANTITY
			[kg/h] *	[A]	[kW]	[l]	[l/min.]	[l/min.]
S04...05	**KUECLA**	230V / 1ph / 50Hz	0.6...2.0	6.5	1.5	1.7	0.6	4.0
S07...12	**KUECLB**	400V / 3ph / 50Hz	1.3...4.5	4.6	3.0	3.3	0.6	4.0
S07...12	**KUECLC**	230V / 3ph / 50Hz	1.3...4.5	8.0	3.0	3.3	0.6	4.0
S13...29 M25−29	**KUECLD**	400V / 3ph / 50Hz	2.7...9.0	9.0	5.8	5.5	0.6	4.0
S13...29 M25−29	**KUECLE**	230V / 3ph / 50Hz	2.7...9.0	15.6	5.8	5.5	0.6	4.0
M31...66	**KUECLD**	400V / 3ph / 50Hz	3.9...13.0	13.0	9.0	5.5	0.6	4.0
M31...66	**KUECLE**	230V / 3ph / 50Hz	3.9...13.0	22.5	9.0	5.5	0.6	4.0
L83...99	**KUECLD**	400V / 3ph / 50Hz	3.9...13.0	13.0	9.0	5.5	0.6	4.0
L83...99	**KUECLE**	230V / 3ph / 50Hz	3.9...13.0	22.5	9.0	5.5	0.6	4.0

Tab. 11b — Humidair specifications for Displacement unit

HPM MODEL	HUMIDAIR MODEL	MAIN POWER SUPPLIES (V ± 10%)	SETTING	ABSORBED CURRENT	POWER	MAX. CYL-INDER WATER VOLUME	MAX. SUPPLY WATER QUANTITY	MAX. DRAIN WATER QUANTITY
			[kg/h] *	[A]	[kW]	[l]	[l/min.]	[l/min.]
S04...05 D	**KUECLA**	230V / 1ph / 50Hz	0.6...2.0	6.5	1.5	1.7	0.6	4.0
S07...12 D	**KUECLB**	400V / 3ph / 50Hz	1.3...2.0	2.0	1.3	3.3	0.6	4.0
S07...12 D	**KUECLC**	230V / 3ph / 50Hz	1.3...2.0	3.6	1.3	3.3	0.6	4.0
S13...29 D M25−29 D	**KUECLD**	400V / 3ph / 50Hz	2.7...4.5	4.6	3.0	5.5	0.6	4.0
S13...29 D M25−29 D	**KUECLE**	230V / 3ph / 50Hz	2.7...4.5	8.0	3.0	5.5	0.6	4.0

For humidifier current (FLA) and rated power refer to electrical features in air conditioner manual.
(*) Unit is factory−set to produce about 70% of the maximum value (see iCom manual).

12 Dimensional Data / Connections

Fig. 12.a Overall dimensions Service Area S models

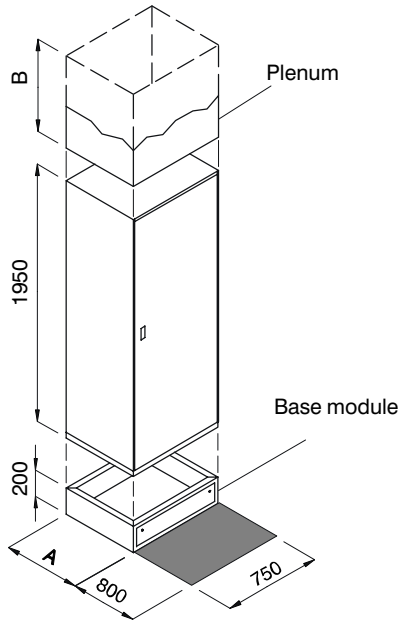


Fig. 12.b Overall dimensions Service Area M25–29

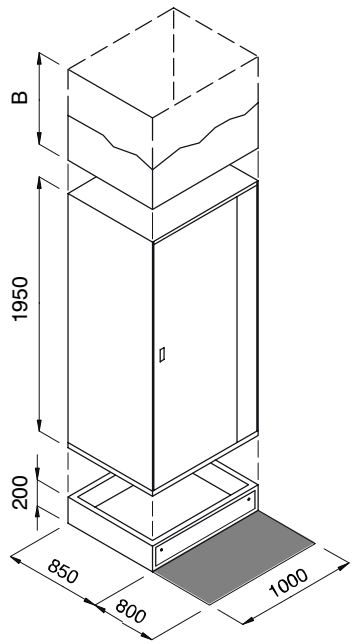


Fig. 12.c Overall dimensions Service Area M31...66

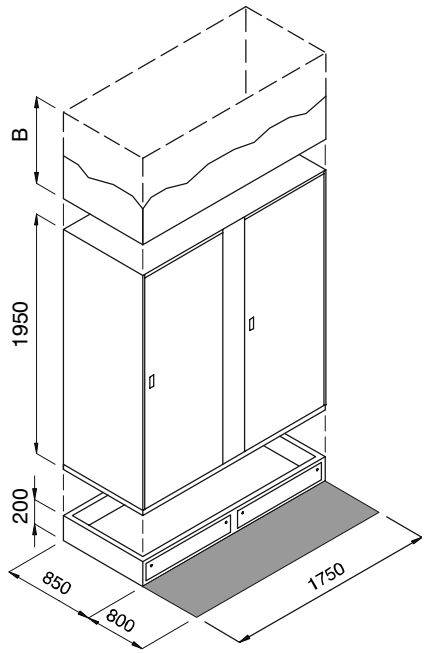
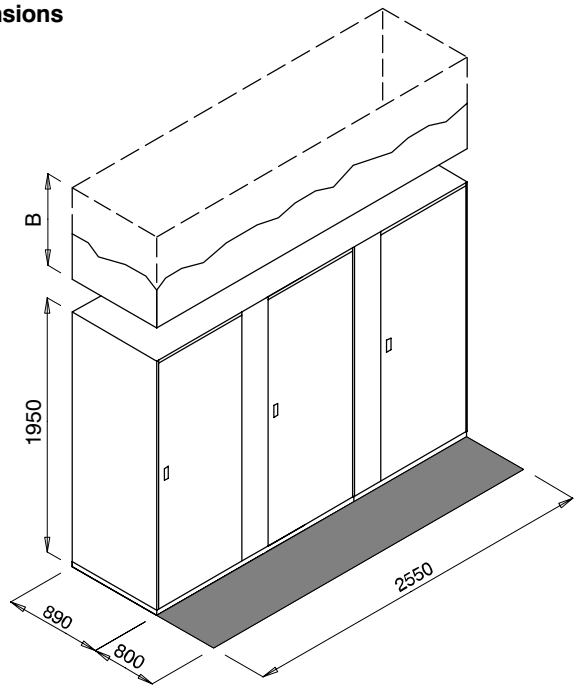


Fig. 12.d Overall dimensions Service Area L83–99

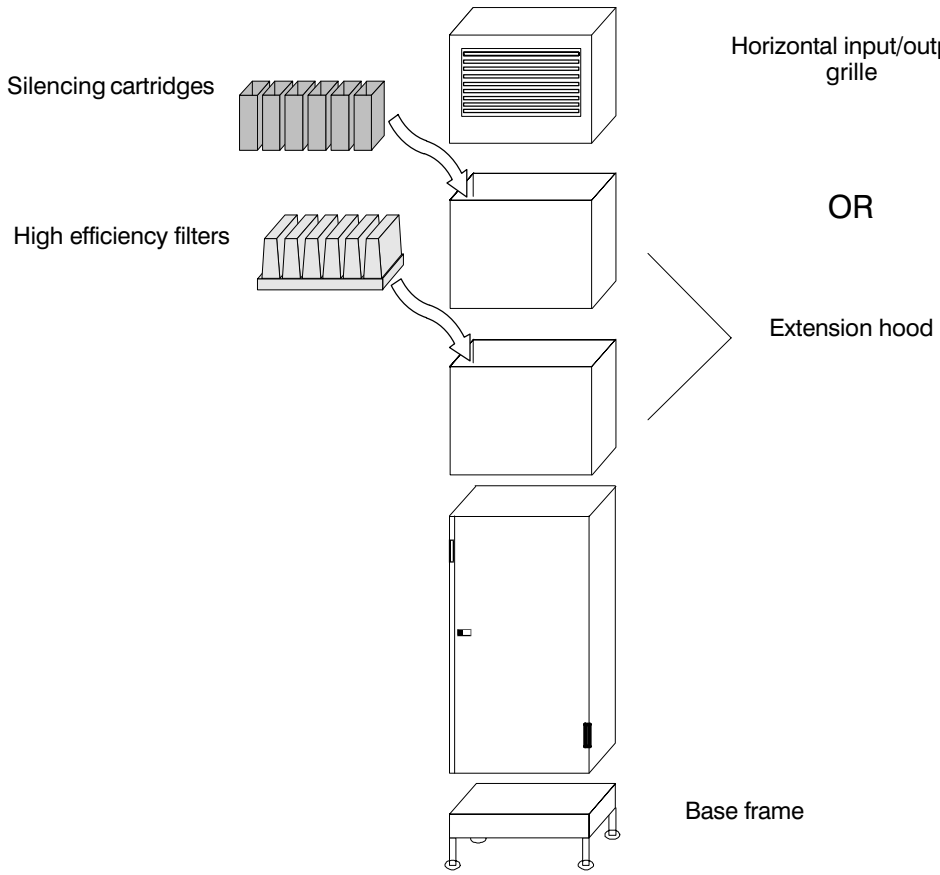


Models	A (mm)	B: AVAILABLE PLENUM HEIGHTS (mm)			
		Plenum simple	Plenum for silencing cartridges	Plenum for high efficiency filters	Plenum with frontal airflow (OVER only)
S04–05	400	500–600–700– 800 – 900–1000–100–1200	**600–900–1200**	500–600–700– 800–900	**600**
S07–10–12	500				
S13–17–20–23	750				
M25–29	850				
M31–34–35–41 42–47–50–58–66	850				
L83–99	890	600–700– 800 – 900–1000–100–1200	600–900–1200	600–700–800–900	–

Dimensional Data / Connections

MODELS	WEIGHTS (kg)						
	Versions						
	A	W	F	D	H	K / A	K / W
S04	160	165					
S05	170	175					
S07	195	200				200	205
S10	210	215				215	220
S12	215	222				222	229
S13	240	247				247	254
S17	250	260	290	280	290	260	270
S20	260	270	310	300	310	270	280
S23	270	280	320	310	320	280	290
M25	415	425	510	500	510	425	435
M29	420	430					
M31	565	575	715	705	715		
M34	580	590	725	715	725		
M35	570	580	720	710	720		
M41	585	600	730	715	730		
M42	585	600	745	730	745		
M47	605	620	740	725	740		
M50	620	635	755	740	755		
M58	625	650	770	745	770		
M66	645	670					
L83	925	950	1140	1115	1140		
L99	975	1000					

Fig. 12.e Accessories and options diagram



Plenum with frontal airflow (Over)

A supply plenum with horizontal air flow can be installed on top of the unit. The 600 mm high plenum has the same design as the unit; it consists of sandwich panels lined with non–flammable insulation material of class 0 (ISO 1182.2), density 30 (see Fig. 12.b). kg/m^3. It is equipped with a double deflection grille.
A single deflection double fin grille can be supplied.

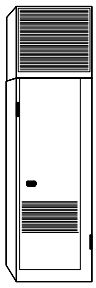
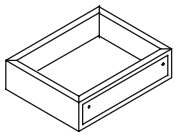


Fig. 12.f

Base modules (Over)

A 200 mm high basemodule can be supplied on request to support Liebert Hiross HPM Over units and at the same time allow pipework to enter the base of the unit when a raised floor is not installed. Some 300 or 500 mm base modules with air filter G4 or F5 efficiency, can be supplied on request to support Liebert Hiross HPM Over units with bottom or rear air intake. Note that in this case the air conditioning unit must be ordered with a blind front panel.

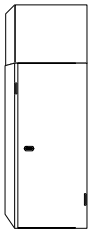
Fig. 12.g



Intake and delivery hoods

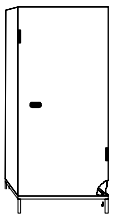
Liebert Hiross HPM can be equipped with intake and supply ducts on the top for connection of the unit to a false ceiling. The air duct is manufactured to complement the design of the unit; it consists of sandwich panels lined with non–flammable insulation material of Class 0 (ISO 1182.2), density 30 kg/m^3; its height ranges between 500 mm and 1200 mm (see Fig. 12.a).

Fig. 12.h



Base frames (option)

Fig. 12.i



When required, a base frame adjustable in height by ±25 mm can be supplied. Three sizes are available: height

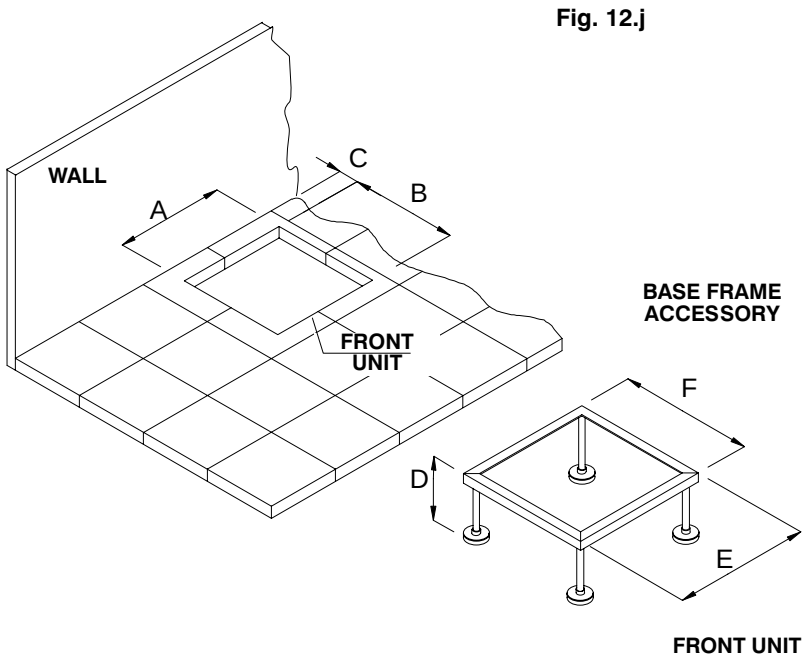
$\leq$ 300 mm;

$\leq$ 500 mm;

$\leq$ 800mm.

Note: This frame allows the installation of more units side by side

Fig. 12.j

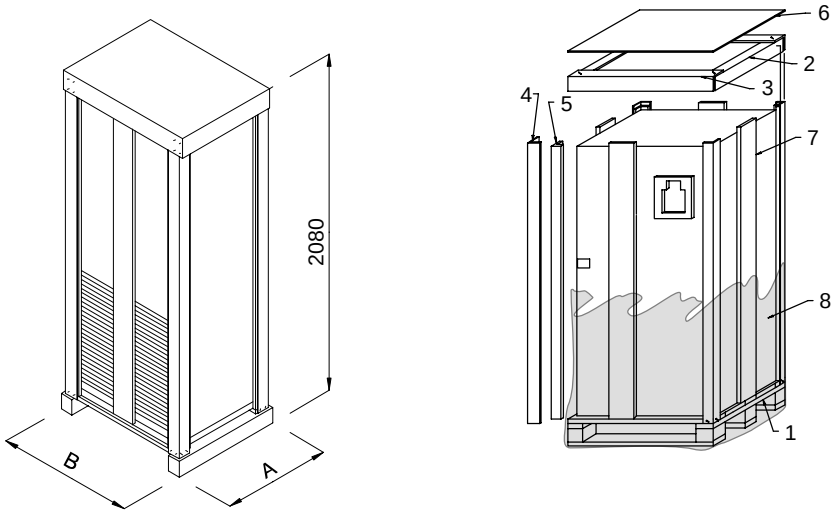


Tab. 12a – Hole in the floor and base frame dimensions

MODELS	Dimensions (mm)								
	A		B		C		D	E	F
	without base frame	with base frame	without base frame	with base frame	without base frame	with base frame			
S04–05	690	750	320	390	50	10	$\leq$ 300	740	380
S07–10–12			420	490					480
S13–17–20–23			670	740					730
M25–29	930	1000	770	840			$\leq$ 500 $\leq$ 800	990	830
M31...66	1680	1750						1740	
L83–99	2460	2550	805	895				2550	885

Packing

Fig. 12.k Packing standard



The air conditioners are usually packed on a wooden pallet (1), with shockproof angle pieces in pressed cardboard (2, 3, 4)/polystyrene (5), panels in cardboard (6)/polystyrene (7) and flexible polythene film (8).

Tab. 12b – Packing depth (A)

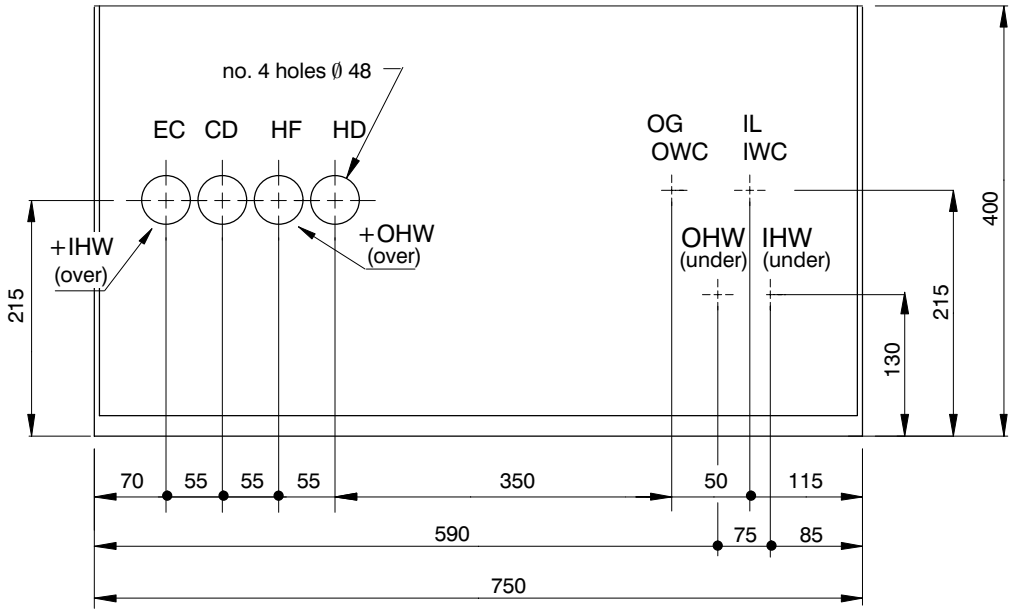
MODELS	Dimensions (mm)	
	A	B
S04–05	480	830
S07–10–12	580	830
S13–17–20–23	830	830
M25–29	930	1080
M31...66	930	1830
L83–99	970	2630

Special packing (options)

Special packing for sea transport, consisting of a wooden box or crate, can be supplied on request.

Dimensional Data / Connections

Fig. 12.I Refrigerant, water and electrical connections Liebert Hiross HPM S 04 ÷ 05 — Plant view

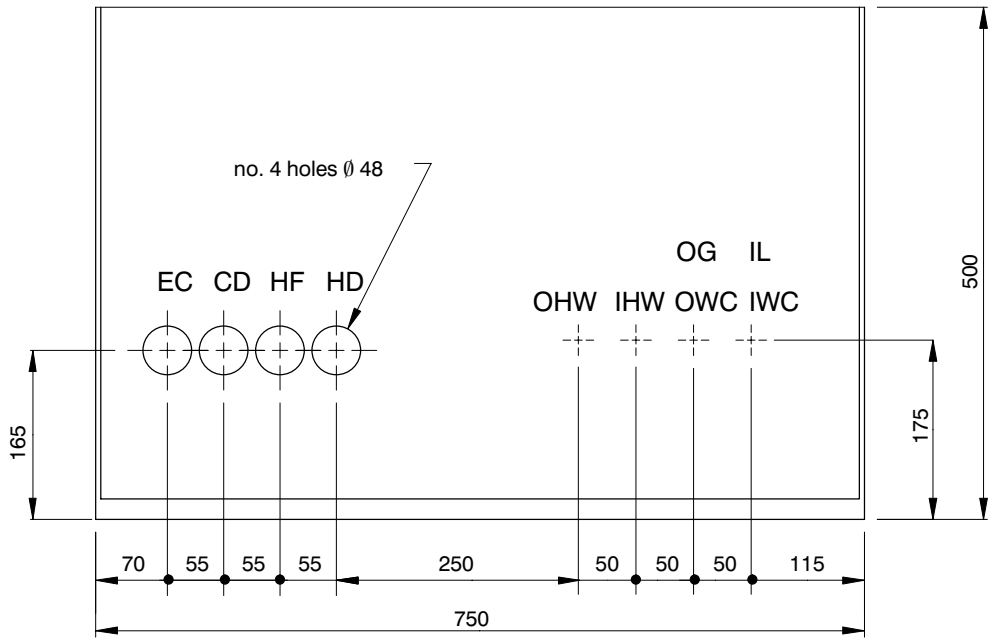


UNIT FRONT

	Unit Connection	Version A	Version W
IL	Refrigerant liquid line inlet *	OD 12 mm	
OG	Refrigerant gas line outlet *	OD 12 mm	
ICW	Chilled water inlet		
OCW	Chilled water outlet		
IWC	Water to condenser inlet		1/2" GAS–F
OWC	Water from condenser outlet		1/2" GAS–F
IHW	Hot water inlet (opt.)	OD 16 mm	
OHW	Hot water outlet (opt.)	OD 16 mm	
CD	Condensate drain	ID 20 mm	
HF	Humidifier feed (opt.)	1/2" GAS–M	
HD	Humidifier drain (opt.)	ID 22 mm	
EC	Electrical power supply	Hole Ø 48 mm	

* ***Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. 12c on page 12 — 12.***

Fig. 12.m Refrigerant, water and electrical connections Liebert Hiross HPM S 07 ÷ 12 — Plant view



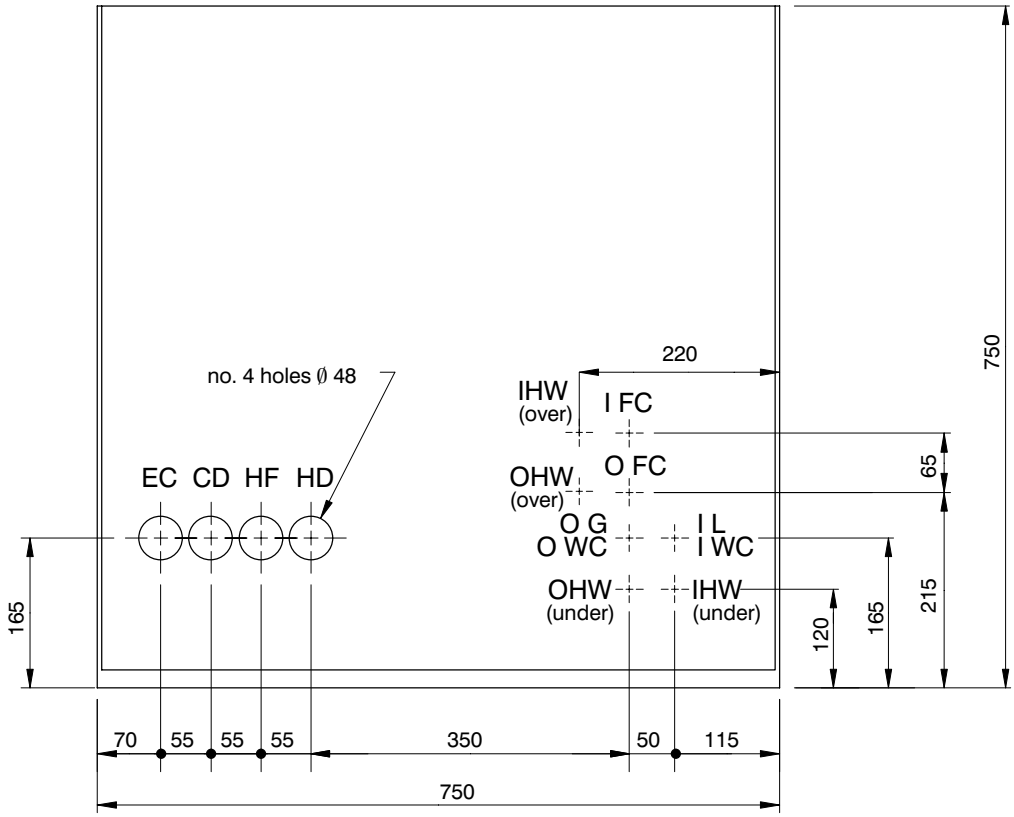
UNIT FRONT

	Unit Connection	Version	
		A	W
IL	Refrigerant liquid line inlet *	OD 12 mm	
OG	Refrigerant gas line outlet *	OD 16 mm	
IWC	Water to condenser inlet		3/4" GAS–F
OWC	Water from condenser outlet		3/4" GAS–F
IHW	Hot water inlet (opt.)	OD 16 mm	
OHW	Hot water outlet (opt.)	OD 16 mm	
CD	Condensate drain	ID 20 mm	
HF	Humidifier feed (opt.)	1/2" GAS–M	
HD	Humidifier drain (opt.)	ID 22 mm	
EC	Electrical power supply	Hole ∅ 48 mm	

* ***Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. 12c on page 12 — 12.***

Dimensional Data / Connections

Fig. 12.n Refrigerant, water and electrical connections Liebert Hiross HPM S 13 ÷ 23



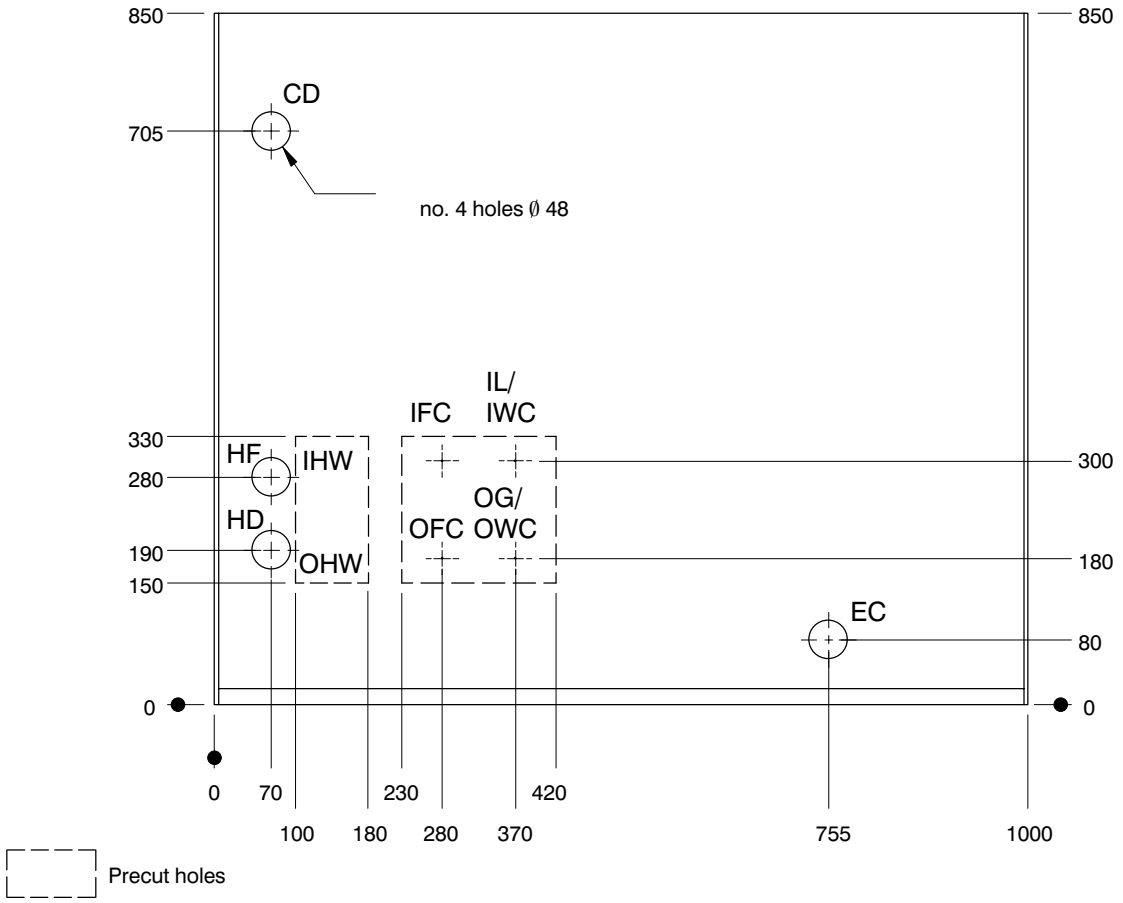
UNIT FRONT

Unit Connection		Version				
		A	W	D	H	F
IL	Refrigerant liquid line inlet *	OD 16 mm		OD 16 mm		
OG	Refrigerant gas line outlet *	OD 18 mm		OD 18 mm		
IWC	Water to condenser inlet		3/4" GAS–F		3/4" GAS–F	
OWC	Water from condenser outlet		3/4" GAS–F		3/4" GAS–F	
IHW	Hot water inlet (opt.)	OD 18 mm				
OHW	Hot water outlet (opt.)	OD 18 mm				
IFC	Water inlet to Freecooling/Dualfluid coil			1" GAS–F	1" GAS–F	1" GAS–F
OFC	Water outlet from Freecooling/Dualfluid coil			1" GAS–F	1" GAS–F	1" GAS–F
CD	Condensate drain	ID 20 mm				
HF	Humidifier feed (opt.)	1/2" GAS–M				
HD	Humidifier drain (opt.)	ID 22 mm				
EC	Electrical power supply	Hole Ø 48 mm				

* ***Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. 12c on page 12 – 12.***

Dimensional Data / Connections

Fig. 12.o Refrigerant, water and electrical connections Liebert Hiross HPM M 25–29



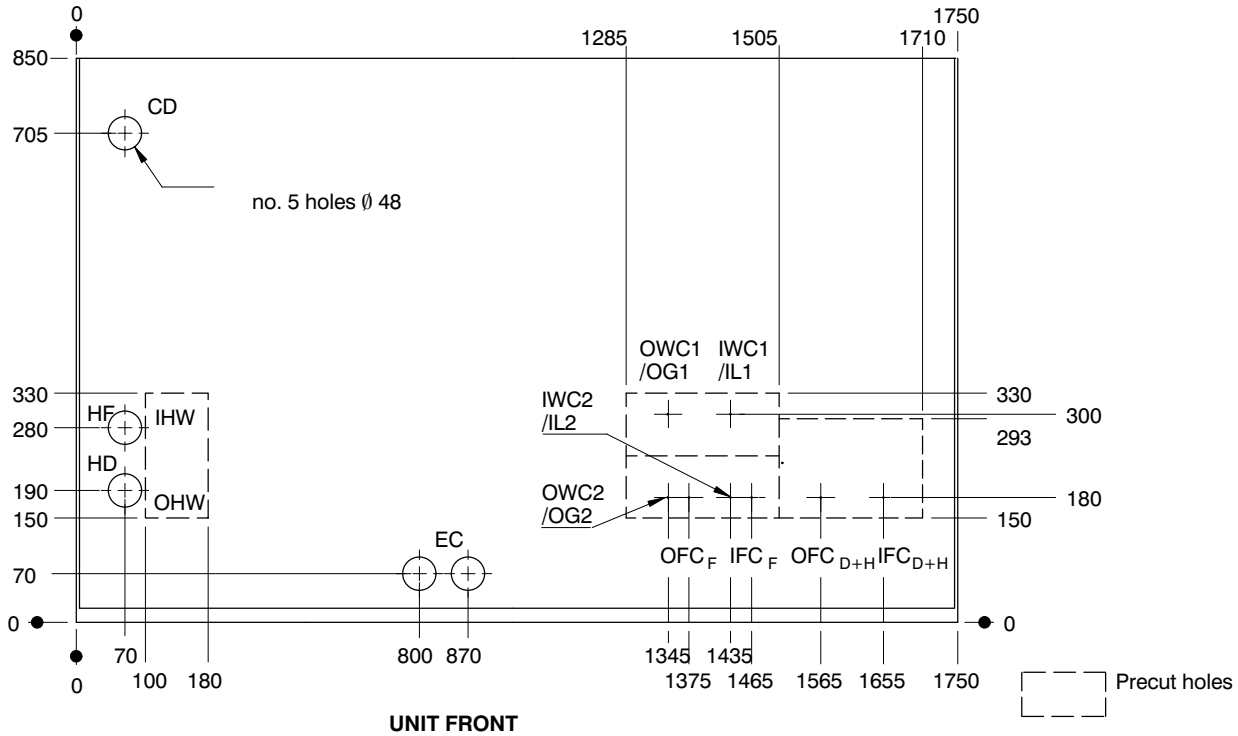
UNIT FRONT

Unit Connection		Version				
		A	W	D	H	F
IL	Refrigerant liquid line inlet *	OD 16 mm		OD 16 mm		
OG	Refrigerant gas line outlet *	OD 18 mm		OD 18 mm		
IWC	Water to condenser inlet		1" GAS–F		1" GAS–F	
OWC	Water from condenser outlet		1" GAS–F		1" GAS–F	
IHW	Hot water inlet (opt.)	OD 18 mm				
OHW	Hot water outlet (opt.)	OD 18 mm				
IFC	Water inlet to Freecooling and Dualfluid coil			1" GAS–F	1" GAS–F	1.1/4" GAS–F
OFC	Water outlet from Freecoolingn and Dualfluid coil			1" GAS–F	1" GAS–F	1.1/4" GAS–F
CD	Condensate drain	ID 20 mm				
HF	Humidifier feed (opt.)	1/2" GAS–M				
HD	Humidifier drain (opt.)	ID 22 mm				
EC	Electrical power supply	Hole ∅ 48 mm				

* ***Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. 12c on page 12 – 12.***

Dimensional Data / Connections

Fig. 12.p Refrigerant, water and electrical connections Liebert Hiross HPM M 31...66



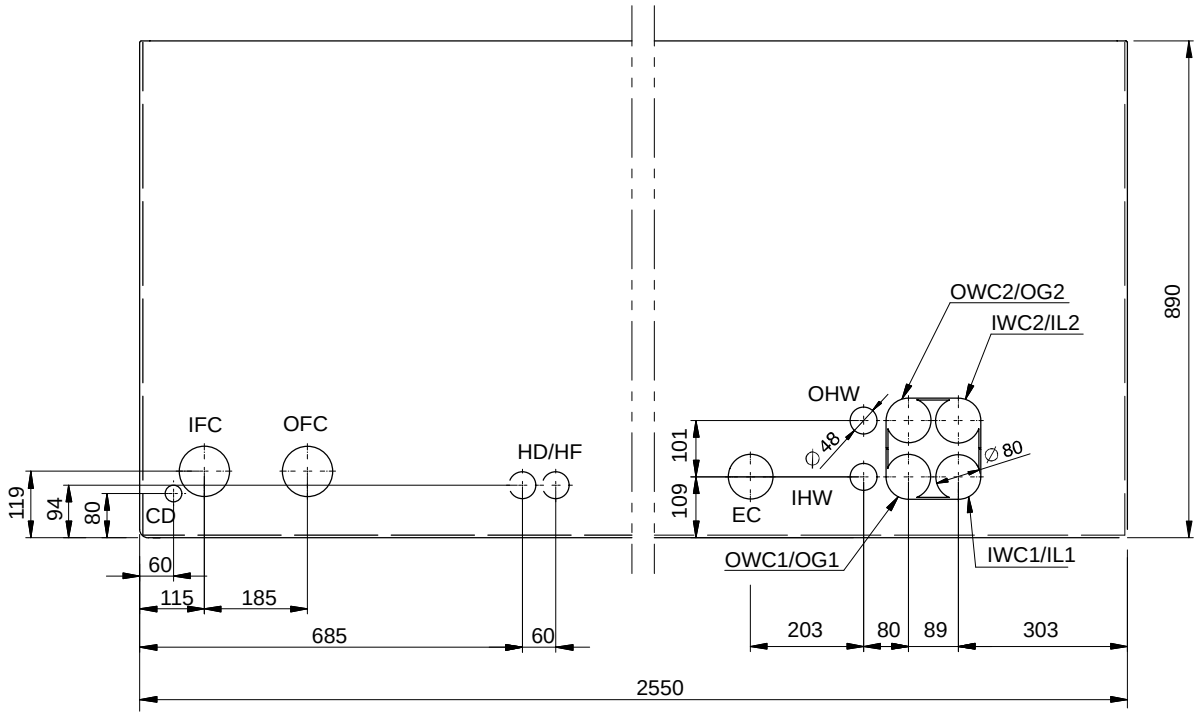
UNIT FRONT

Models	Unit Connection		Version A	W	D	H	F
M31–34–35–42–50–58–66	IL1	Refrigerant liquid line inlet 1*	OD 16 mm		OD 16 mm		
M41–47	IL1		OD 18 mm		OD 18 mm		
M34–42–50–58–66	IL2	Refrigerant liquid line inlet 2*	OD 16 mm		OD 16 mm		
M31–34–35–42 50–58–66	OG1	Refrigerant gas line outtlet 1*	OD 18 mm		OD 18 mm		
M41–47	OG1		OD 22 mm		OD 22 mm		
M34–42–50–58–66	OG2	Refrigerant gas line outlet 2 *	OD 18 mm		OD 18 mm		
M31–35–41–47 50–58–66	IWC1	Water to condenser 1 inlet		1.1/4" GAS–F		1.1/4" GAS–F	
M34–42	IWC1			3/4" GAS–F		3/4" GAS–F	
M34–42	IWC2	Water to condenser 2 inlet		3/4" GAS–F		3/4" GAS–F	
M50–58–66	IWC2			1.1/4" GAS–F		1.1/4" GAS–F	
M31–35–41–47 50–58–66	OWC1	Water from condenser 1 outlet		1.1/4" GAS–F		1.1/4" GAS–F	
M34–42	OWC1			3/4" GAS–F		3/4" GAS–F	
M34–42	OWC2	Water from condenser 2 outlet		3/4" GAS–F		3/4" GAS–F	
M50–58–66	OWC2			1.1/4" GAS–F		1.1/4" GAS–F	
Mxx	IHW	Hot water inlet (opt.)	OD 22 mm				
Mxx	OHW	Hot water outlet (opt.)	OD 22 mm				
M31–34–35	IFC (F)	Water inlet to Freecooling					1.1/4" GAS–F
M41–42–47–50–58	IFC (F)						1.1/2" GAS–F
M31–34–35	OFC (F)	Water outlet from Freecooling					1.1/4" GAS–F
M41–42–47–50–58	OFC (F)						1.1/2" GAS–F
M31–34–35	IFC (D+C)	Water inlet to Dualfluid			1.1/4" GAS–F	1.1/4" GAS–F	
M41–42–47–50–58	IFC (D+C)				1.1/2" GAS–F	1.1/2" GAS–F	
M31–34–35	OFC (D+C)	Water outlet from Dualfluid			1.1/4" GAS–F	1.1/4" GAS–F	
M41–42–47–50–58	OFC (D+C)				1.1/2" GAS–F	1.1/2" GAS–F	
Mxx	CD	Condensate drain	ID 20 mm				
Mxx	HF	Humidifier feed (opt.)	1/2" GAS–M				
Mxx	HD	Humidifier drain (opt.)	ID 22 mm				
Mxx	EC	Electrical power supply	Hole ∅ 48 mm				

* ***Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. 12c on page 12 – 12.***

Dimensional Data / Connections

Fig. 12.q Refrigerant, water and electrical connections Liebert Hiross HPM L83–99



UNIT FRONT

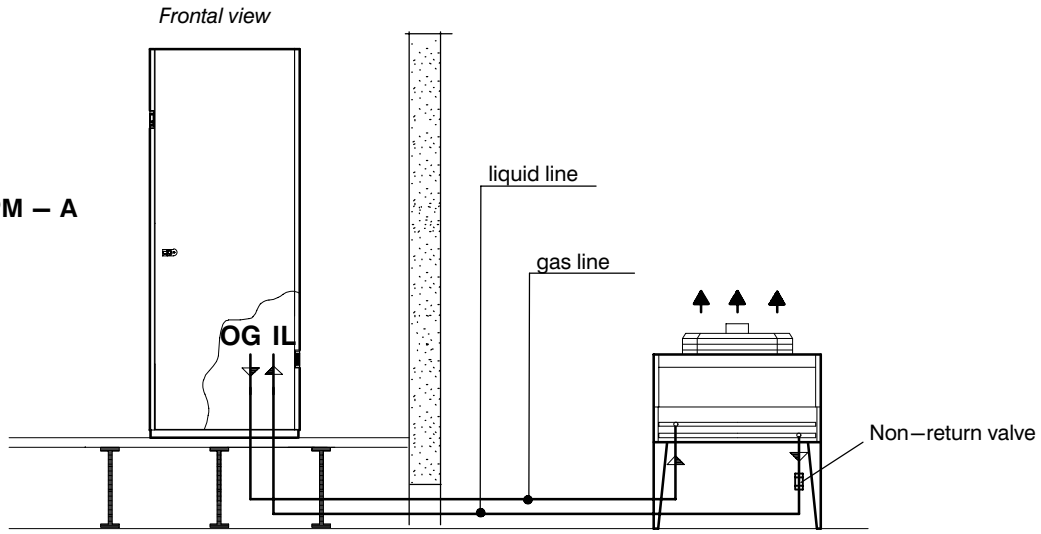
Models	Unit Connection		Version				
			A	W	D	H	F
L83–99	IL1	Refrigerant liquid line inlet 1 *	OD 18 mm		OD 18 mm		
L83–99	IL2	Refrigerant liquid line inlet 2 *	OD 18 mm		OD 18 mm		
L83–99	OG1	Refrigerant gas line outlet 1 *	OD 22 mm		OD 22 mm		
L83–99	OG2	Refrigerant gas line outlet 2 *	OD 22 mm		OD 22 mm		
L83–99	IWC1	Water to condenser 1 inlet		1.1/4"GAS–F		1.1/4"GAS–F	
L83–99	IWC2	Water to condenser 2 inlet		1.1/4"GAS–F		1.1/4"GAS–F	
L83–99	OWC1	Water from condenser 1 outlet		1.1/4"GAS–F		1.1/4"GAS–F	
L83–99	OWC2	Water from condenser 2 outlet		1.1/4"GAS–F		1.1/4"GAS–F	
Lxx	IHW	Hot water inlet (opt.)	OD 22 mm				
Lxx	OHW	Hot water outlet (opt.)	OD 22 mm				
L83	IFC (F)	Water inlet to Freecooling					2.1/2"GAS–M
L83	OFC (F)	Water outlet from Freecooling					2.1/2"GAS–M
L83	IFC (D+C)	Water inlet to Dualfluid			2.1/2"GAS–M	2.1/2"GAS–M	
L83	OFC (D+C)	Water outlet from Dualfluid			2.1/2"GAS–M	2.1/2"GAS–M	
Lxx	CD	Condensate drain	ID 20 mm				
Lxx	HF	Humidifier feed (opt.)	1/2" GAS–M				
Lxx	HD	Humidifier drain (opt.)	ID 22 mm				
Lxx	EC	Electrical power supply	Hole ∅ 80 mm				

* ***Connection size only. The dimension of the connecting pipe depends on unit model and refrigerant, see Tab. 12c on page 12 – 12.***

Dimensional Data / Connections

Fig. 12.r Refrigeration connections

Liebert Hiross HPM – A



OG	Refrigerant pipe outlet
IL	Refrigerant pipe inlet

Notes: *recommended diameters see Table in Chap. 4.*

Tab. 12c – Pipe diameters (room unit – remote condenser)

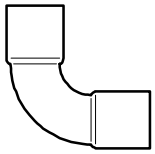
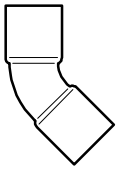
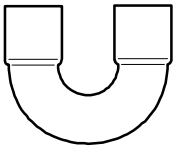
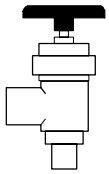
STANDARD PIPE DIAMETERS (Valid for equivalent lengths up to 30 m)				
MOD.	**copper tube external diametre X thickness (mm) R407C**		**copper tube external diametre X thickness (mm) R22**	
	Gas	**Liquid**	**Gas**	**Liquid**
S04–05	10 X 1	10 X 1	10 X 1	10 X 1
S07	12 X 1	12 X 1	12 X 1	10 X 1
S10	12 X 1	12 X 1	12 X 1	12 X 1
S12	14 X 1	14 X 1	14 X 1	14 X 1
S13	14 X 1	14 X 1	16 X 1	16 X 1
S17	16 X 1	16 X 1	16 X 1	16 X 1
S20	18 X 1	16 X 1	22 X 1	18 X 1
S23	22 X 1	18 X 1	22 X 1	18 X 1
M25–29–31	22 X 1	18 X 1	22 X 1	18 X 1
M34	16 X 1	16 X 1	16 X 1	16 X 1
M35	22 X 1	18 X 1	28 X 1	22 X 1
M41–47	28 X 1	22 X 1	28 X 1	22 X 1
M42	18 X 1	16 X 1	22 X 1	18 X 1
M50–58	22 X 1	18 X 1	22 X 1	18 X 1
M66	22 X 1	18 X 1	28 X 1	22 X 1
L83	28 X 1	22 X 1	28 X 1	22 X 1
L99	28 X 1	22 X 1	28 X 1	22 X 1

For equivalent lengths up to 50 m:

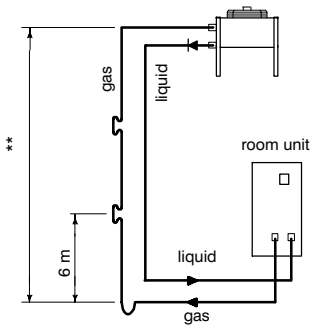
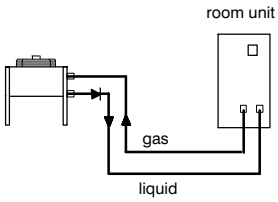
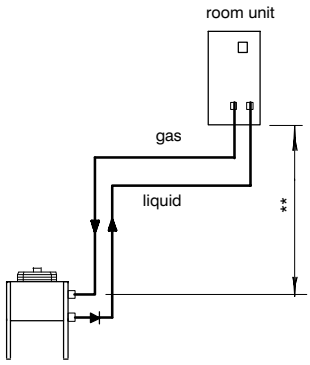
- Equal diameters
- Max. geodetic height difference between condenser and room unit: from +30 to –8 m (when the condenser is placed underneath the room unit):
- Variex at the condenser
- Oversizing of the condenser at least of 15% more than standard capacity
- Hot gas reheat not allowed.
- Syphon on the vertical gas lines every 6 metres
- Relevant extra oil charge.
- Non return valve in the refrigerant discharge pipe 2m far from the compressor.

Dimensional Data / Connections

Tab. 12d — Equivalent lengths in meters of: curves, shut—off and non—return valves

Nominal diameter (mm)	 90°	 45°	 180°	 90°	
12	0.50	0.25	0.75	2.10	1.90
14	0.53	0.26	0.80	2.20	2.00
16	0.55	0.27	0.85	2.40	2.10
18	0.60	0.30	0.95	2.70	2.40
22	0.70	0.35	1.10	3.20	2.80
28	0.80	0.45	1.30	4.00	3.30

Tab. 12e — Condenser positioning

CONDENSER POSITION			CONDENSER ABOVE CONDITIONER	CONDENSER AND CONDITIONER AT SAME LEVEL	CONDENSER BELOW CONDITIONER (not recommended)
INSULATION	gas	int.	necessary	necessary	necessary
		ext.	only for aesthetic reasons	only for aesthetic reasons	only for aesthetic reasons
	liq.	int.	absolutely not	not necessary	no (expose to cold underfloor air)
		ext.	only for aesthetic reasons	only if exposed to sun	only if exposed to sun
LAYOUT			 (**) see Chap. 3		 (**) see Chap. 3

13 All Options / Accessories

Silencing cartridges for supply hoods
See Chap. 7

Special Cartridges
See Chap. 8

Heating—Reheat and humidity control
See Chap. 8

High efficiency filters
See Chap. 9

Filter holding duct
See Chap. 9

Clogged filter alarm
See Chap. 9

Fresh air kit
See Chap. 9

Humidifier
See Chap. 11

Delivery plenum with frontal airflow for Over models
See Chap. 12

Base modules
See Chap. 12

Intake and delivery hoods
See Chap. 12

Base frames
See Chap. 12

Special packing
See Chap. 12

Flooding alarm (Liquistat)

The flooding alarm detects the presence of water or of any other conductive liquid and, opening a circuit, activates an alarm.
There are no moving parts and it is not subject to dirt or vibration. Up to 5 sensors can be connected to the same flooding alarm device to control many points in the room. The alarm device is supplied with a sensor. Additional sensors can be ordered separately.

Smoke alarm (Smokestat)

A smoke alarm can be installed to stop the conditioning system when the presence of smoke in the intake air is perceived.
This is an optical smoke detector (it uses the Tyndall effect), which absorbs very low current (100mA) and is absolutely insensitive to light or wind.

Fire alarm (Firestat)

In some applications the fire regulations require the installation of an alarm device (Firestat) which deactivates the air conditioner when the intake air temperature is too high.

All Options / Accessories

Automatic condensate pump

The Liebert Hiross HPM's condensate drain piping can be connected to a pump complete with a flow cutout that permits the pump to stop and reset automatically.

Tab. 13f — Features of the automatic pump for condensate discharge

water flow	[l/s]	0.083	0.167	0.250	0.333
available head	[kPa]	20	19	18	14

Non—return valves (Versions A and D)

For air—cooled units, a non—return valve is supplied on request in a separate kit. It should be installed on the liquid line near the condenser, in a vertical position with downward flow.

Additional temperature and humidity sensor (EEAP)

EEAP (Environmental Alarm Package) is an additional temperature and relative humidity sensor similar to the humitemp sensor.The sensor can be installed in a suitable place up to 20 m from the air conditioner. It generates an alarm if the temperature or the relative humidity exceeds one of the four thresholds that can be selected by the user:

High temperature: (from 10°C to 50°C)
low temperature: (from 0°C to 30°C)
high relative humidity: (from 30% to 99%)
low relative humidity: (from 10% to 70%).

Bottom air intake (Over models)

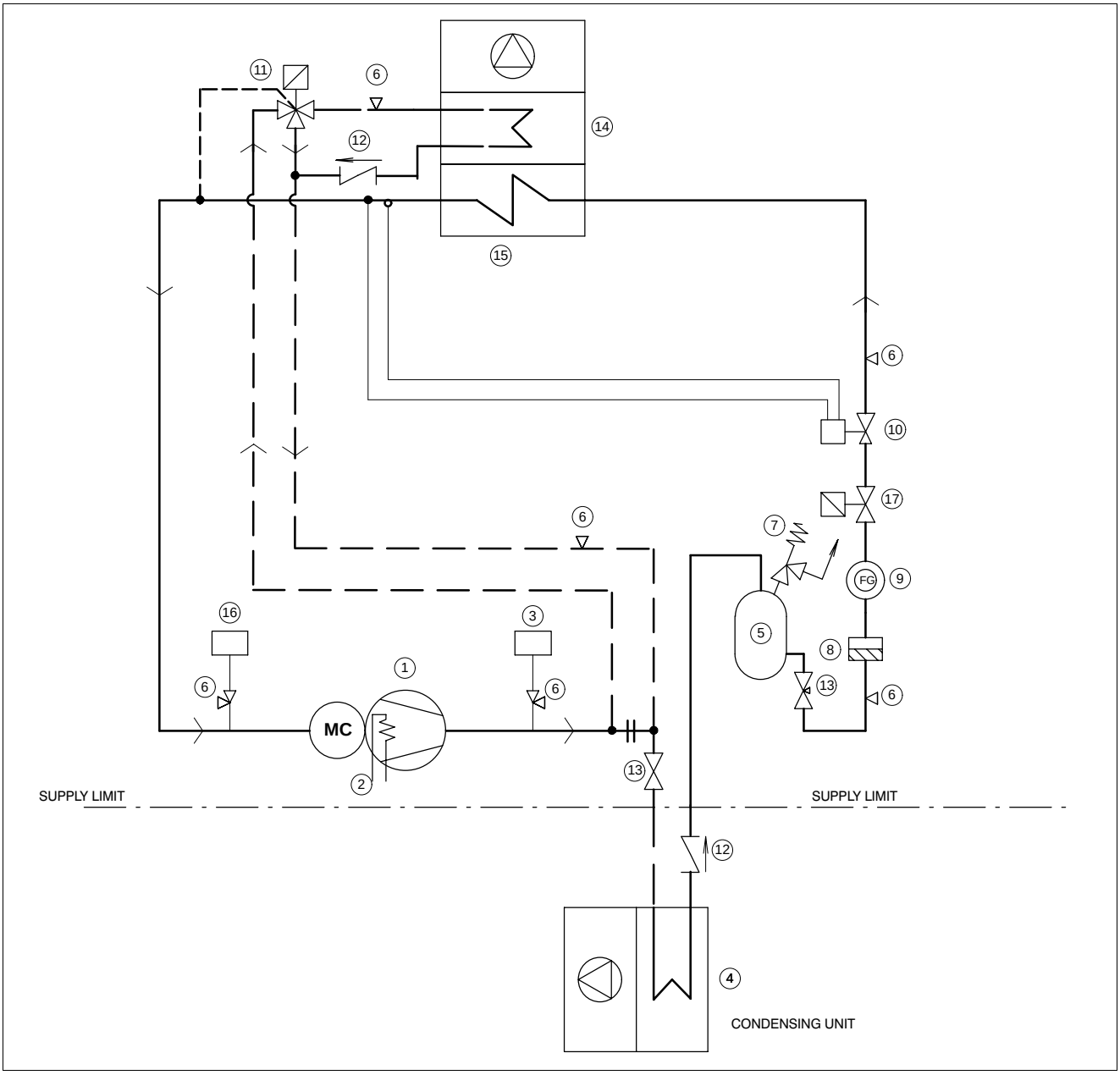
Liebert Hiross HPM units can be supplied to permit air intake from below. In this case, the front panel with intake grille is replaced by a special blind panel, which further reduces noise levels.

Epoxy Coated Coils

Remote condensers are available with aluminium fins coated by an epoxy film, for aggressive environments.

14 Refrigerant and Hydraulic Circuits

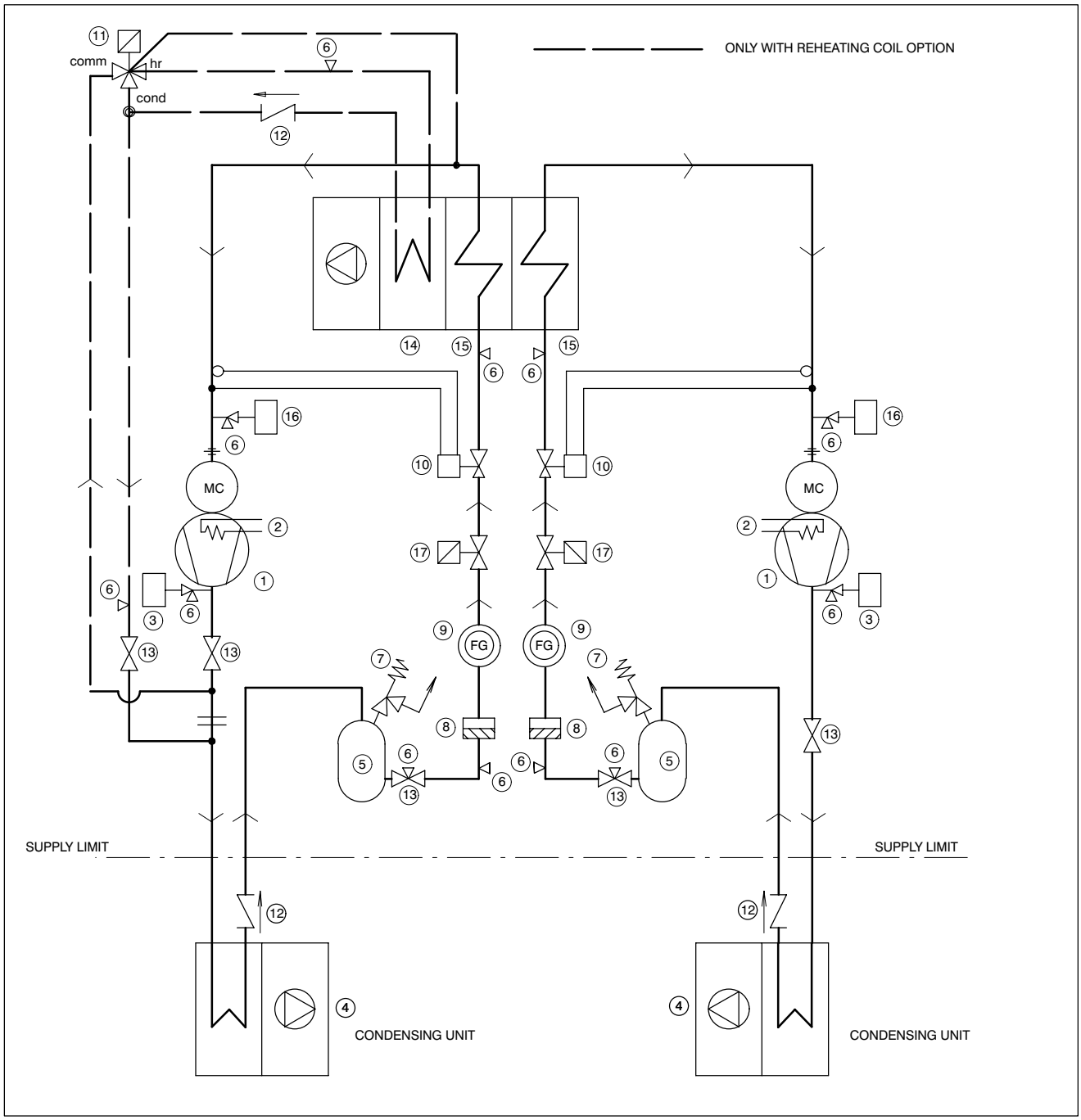
Fig. 14.1 – Liebert Hiross HPM Sxx U/O A, M25–47 U/O A



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass

POS.	DESCRIPTION
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve

Fig. 14.2 – Liebert Hiross HPM M34–66 U/O A

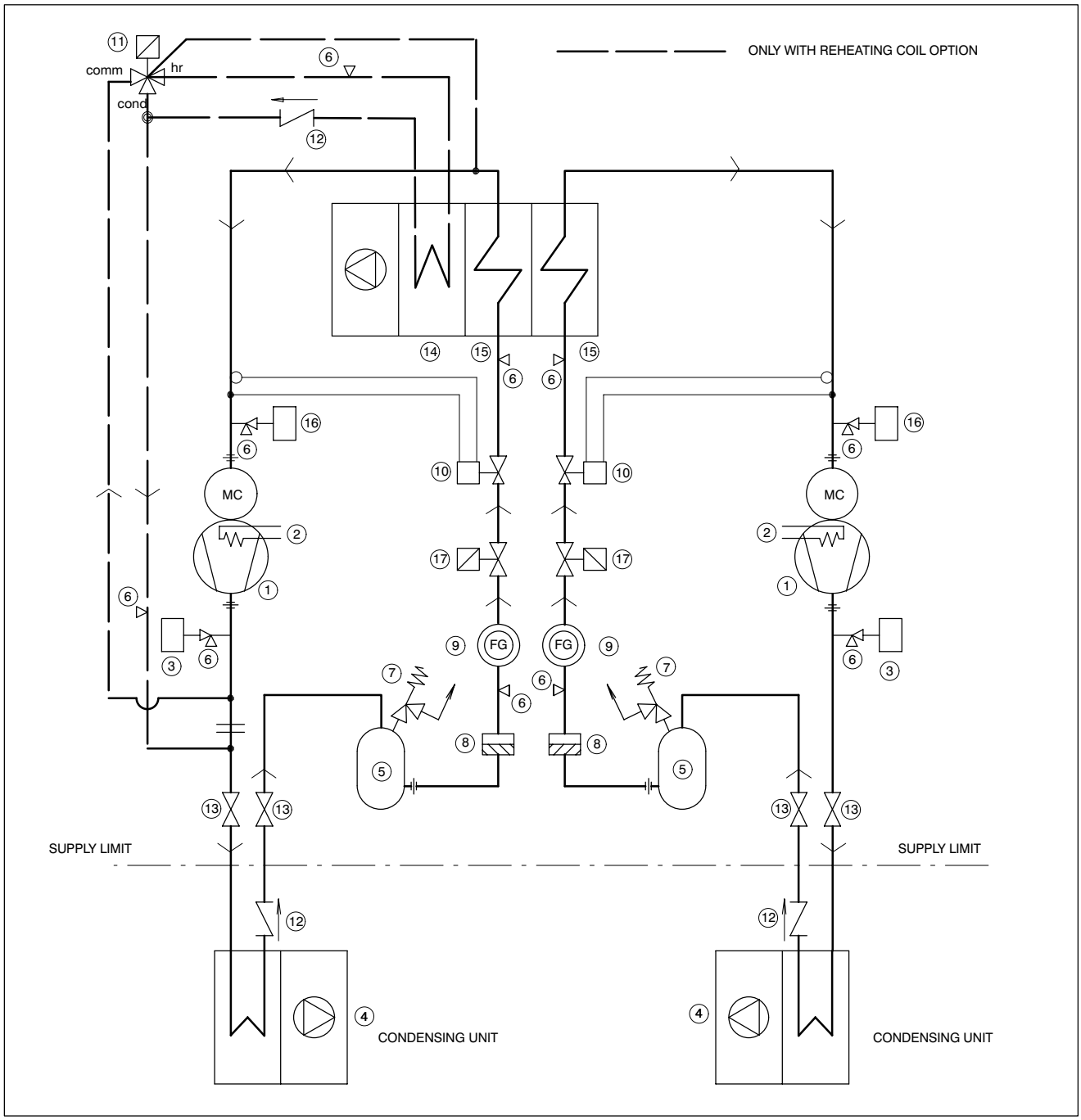


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass

POS.	DESCRIPTION
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve

Refrigerant and Hydraulic Circuits

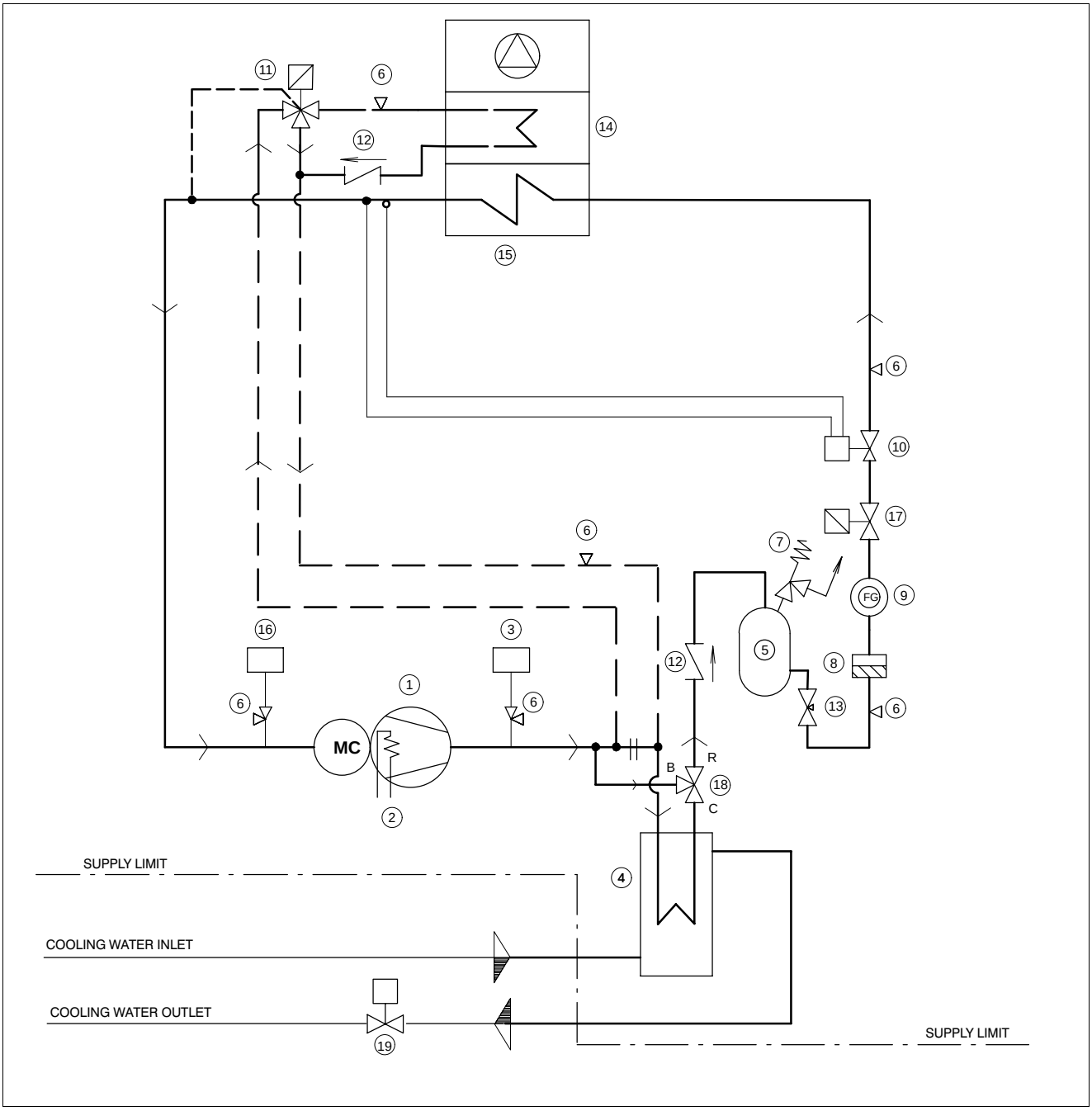
Fig. 14.3 – Liebert Hiross HPM L83–99 U A



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass

POS.	DESCRIPTION
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve

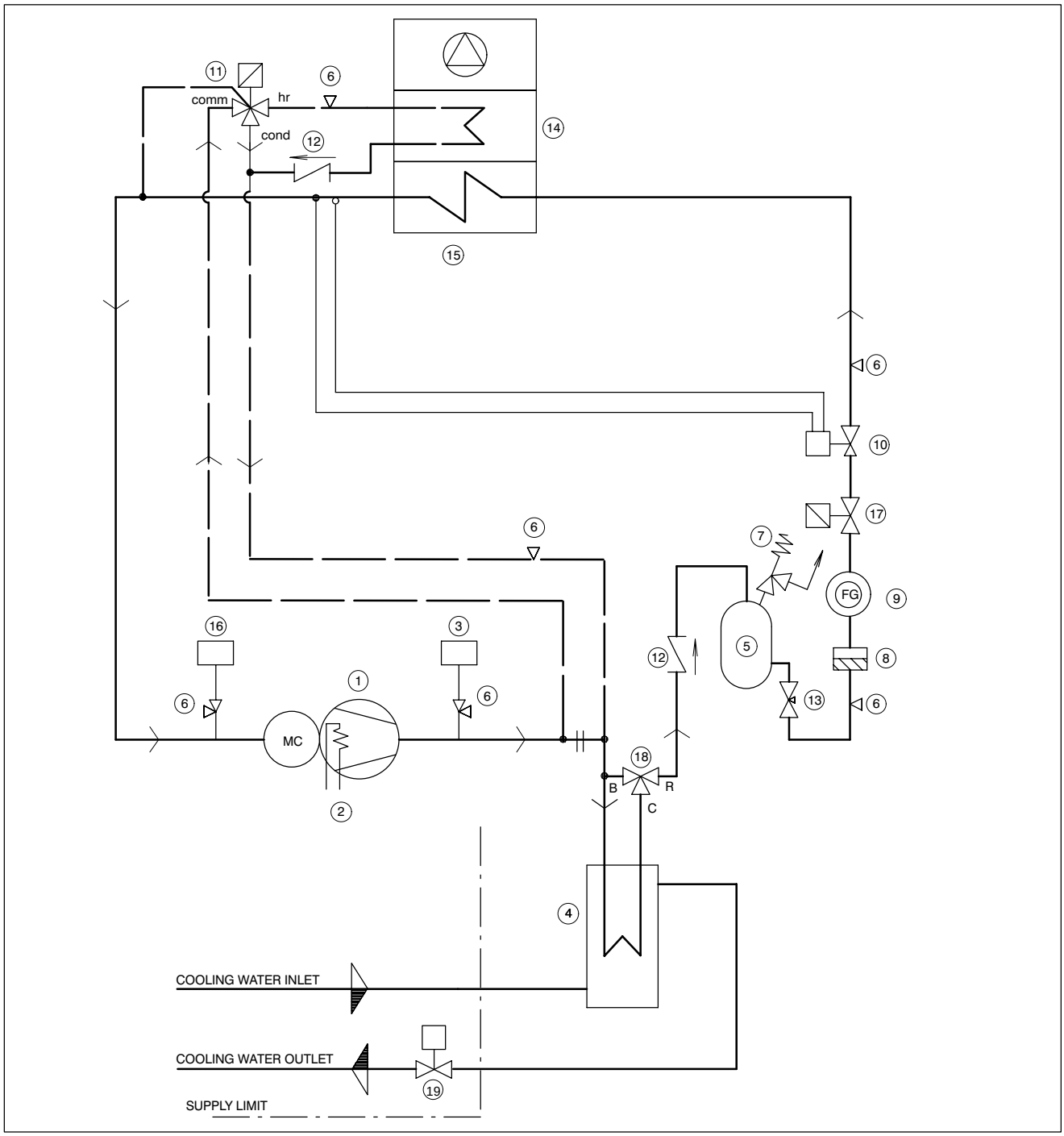
Fig. 14.4 – Liebert Hiross HPM Sxx U/O W



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Water solenoid valve (by the customer)

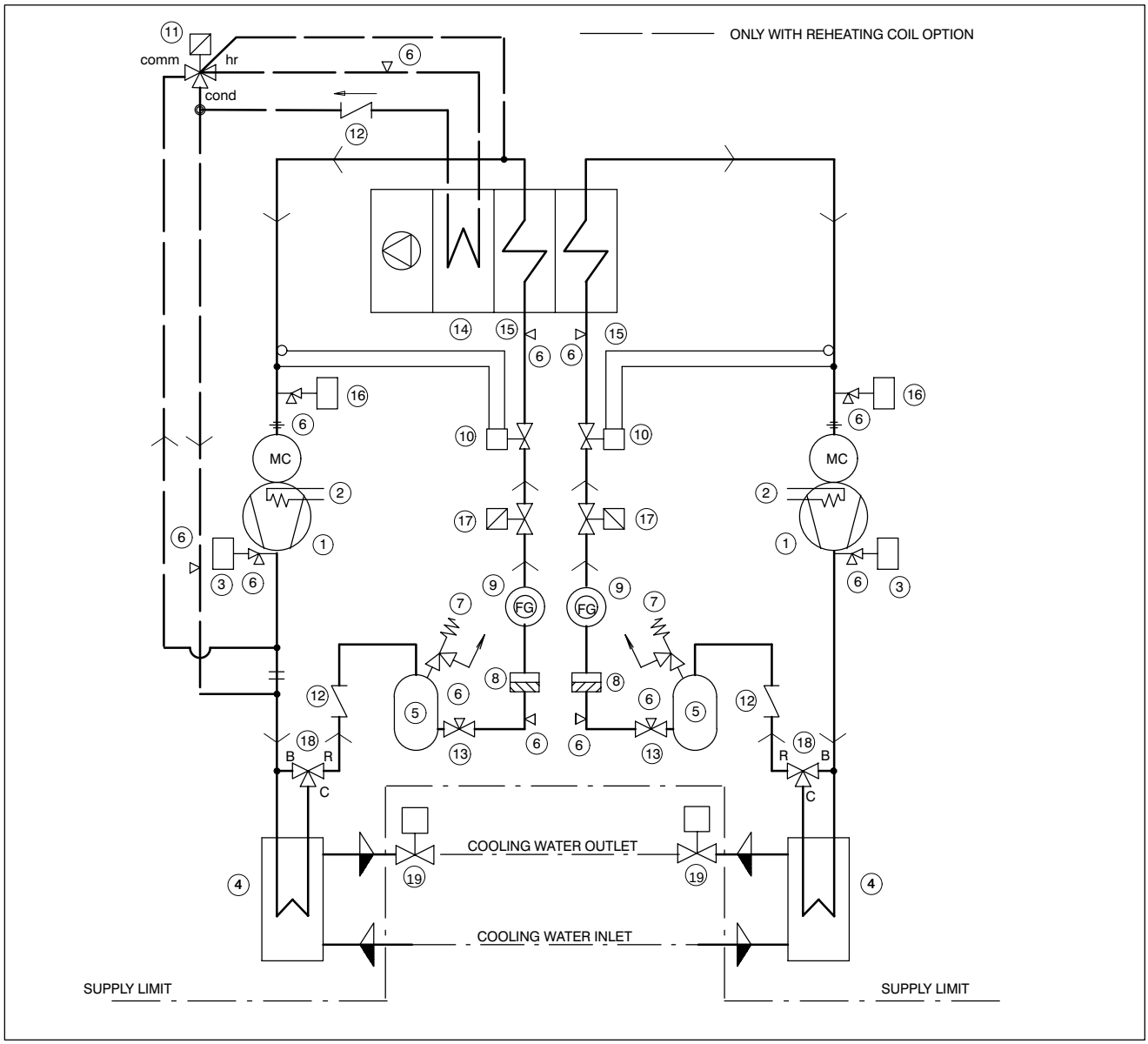
Fig. 14.5 – Liebert Hiross HPM M25–47 U/O W



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Water solenoid valve (by the customer)

Fig. 14.6 – Liebert Hiross HPM M34–66 U/O W

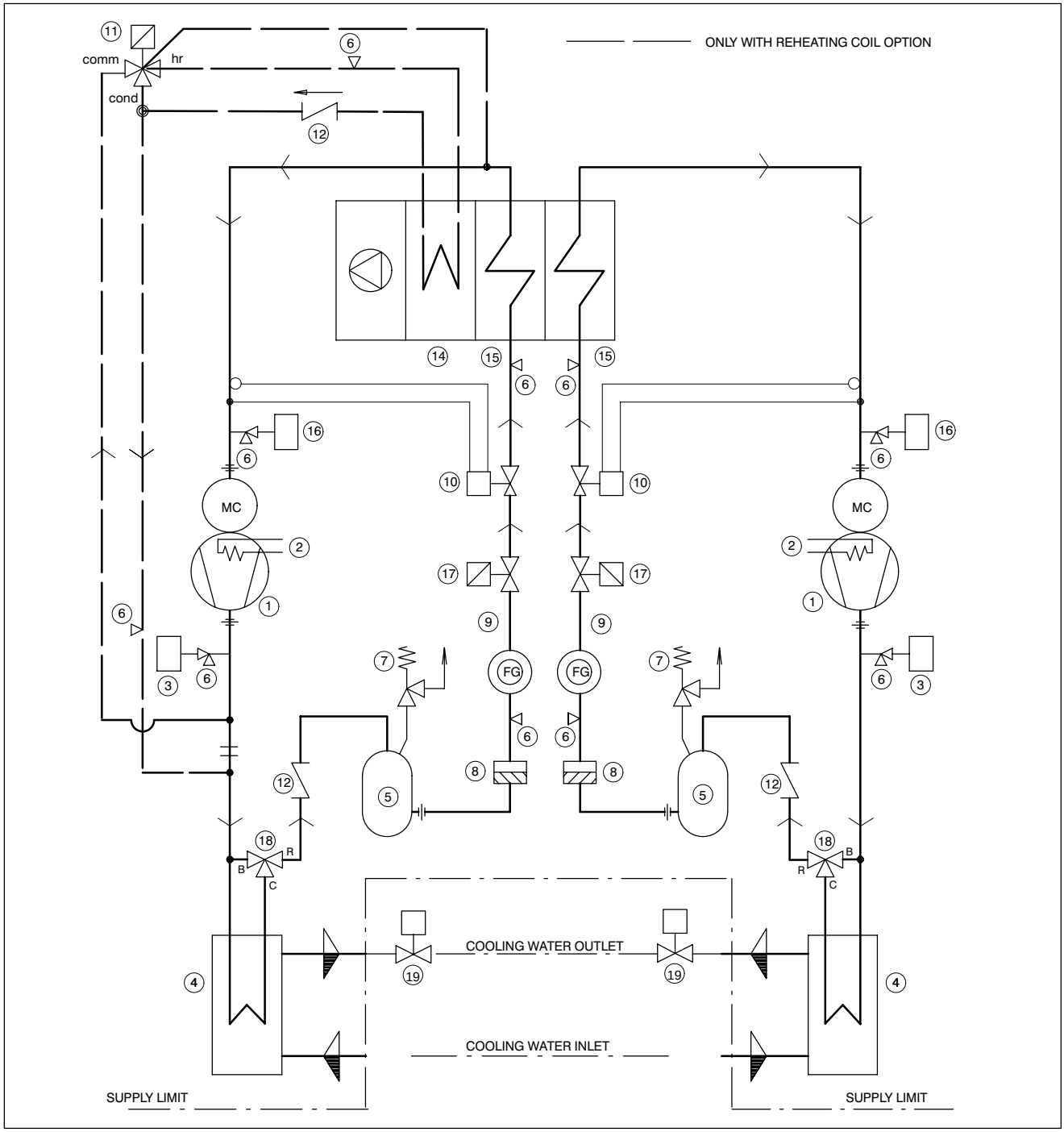


POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Water solenoid valve (by the customer)

Refrigerant and Hydraulic Circuits

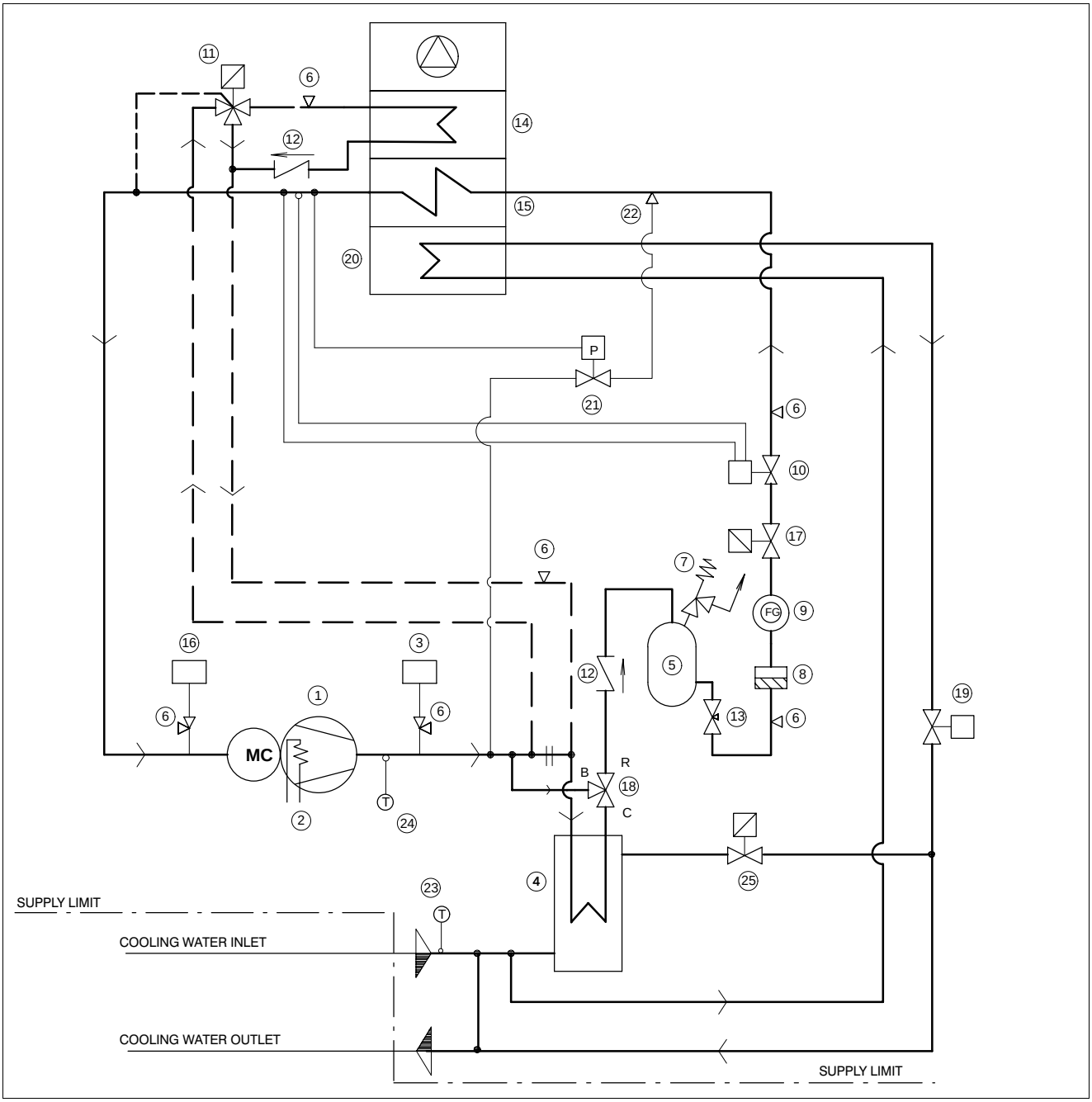
Fig. 14.7 – Liebert Hiross HPM L83–99 U W



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Water solenoid valve (by the customer)

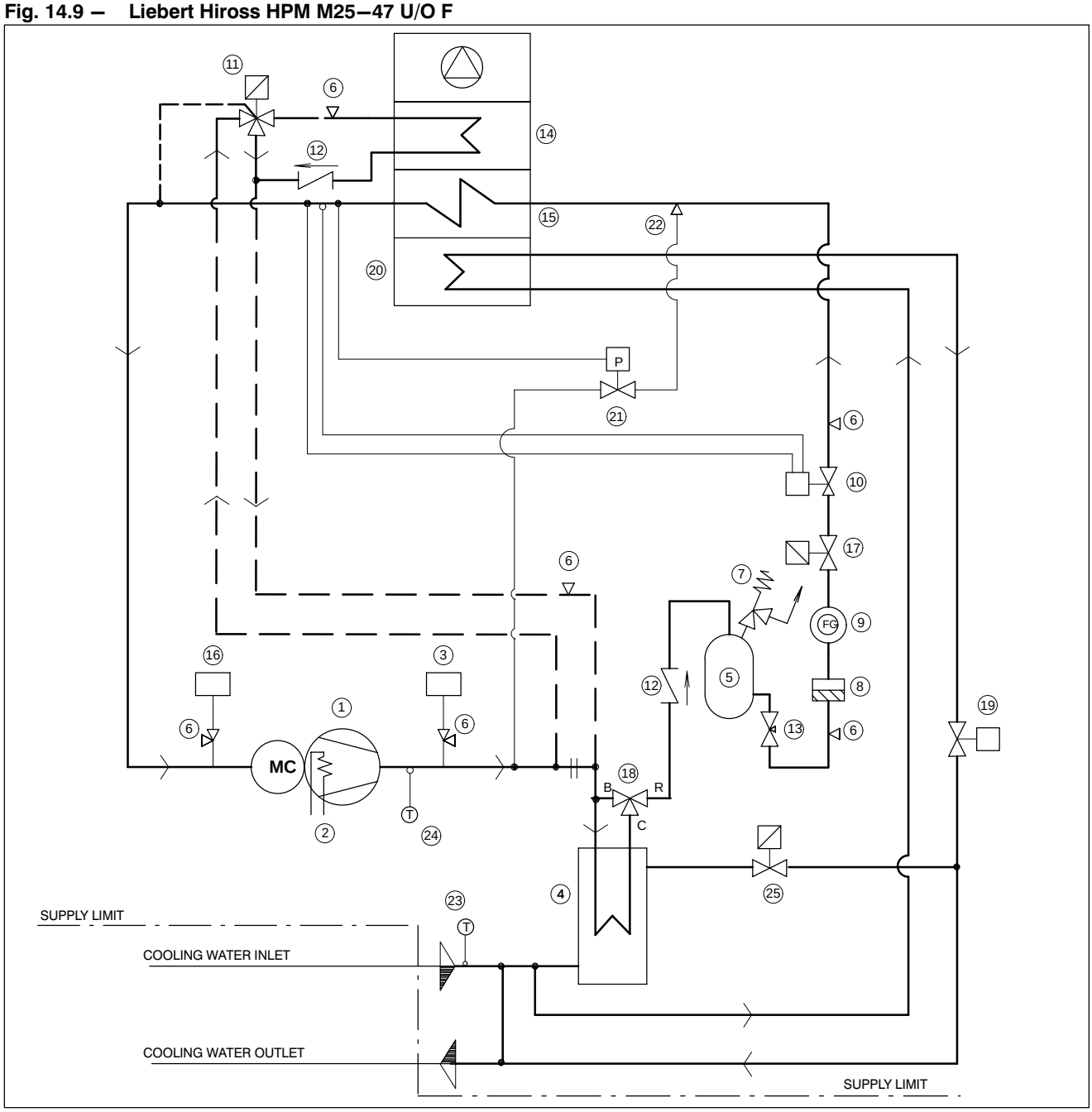
Fig. 14.8 – Liebert Hiross HPM Sxx U/O F



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 2–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Solenoid water valve

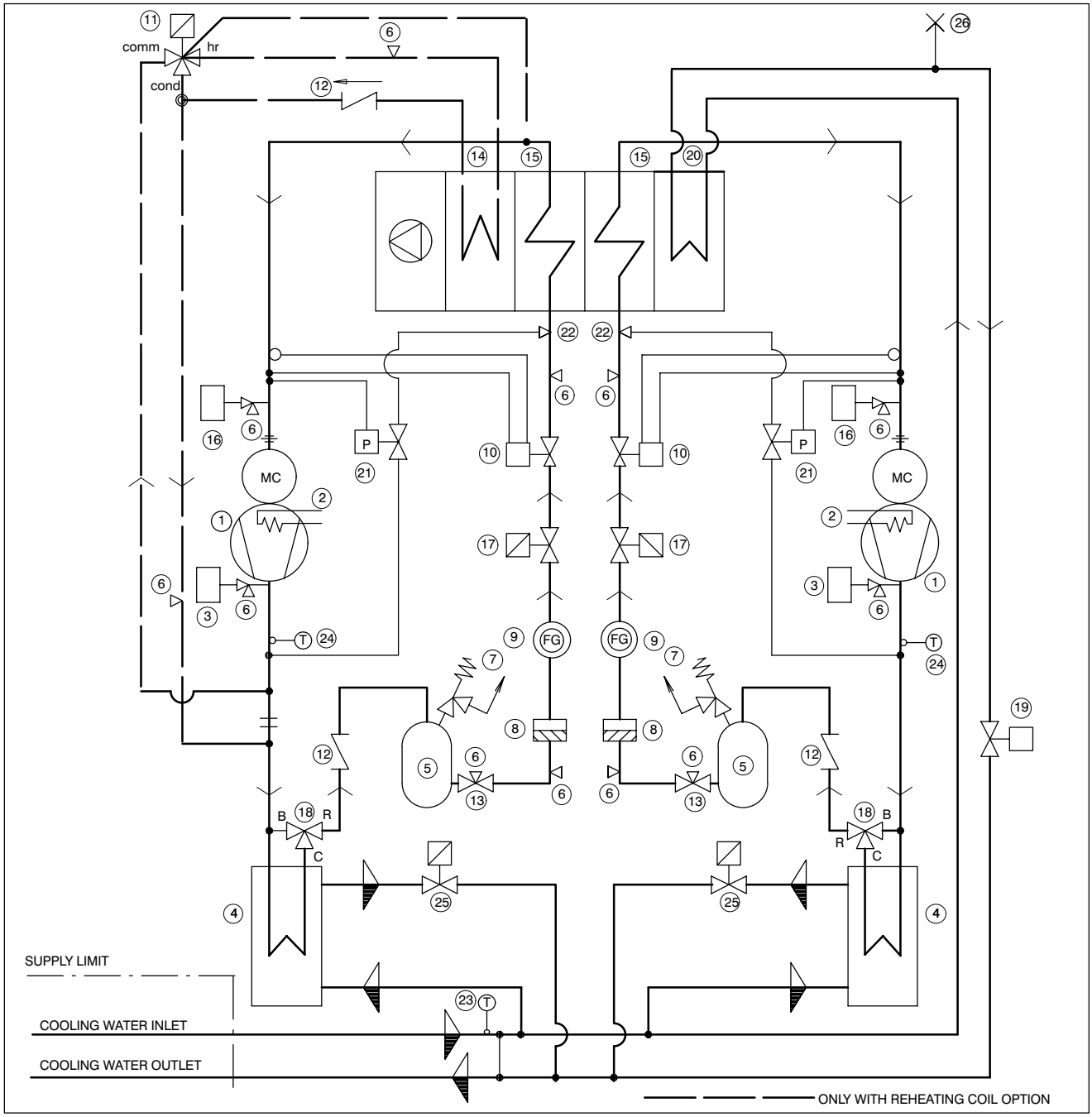
Fig. 14.9 – Liebert Hiross HPM M25–47 U/O F



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 2–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Solenoid water valve

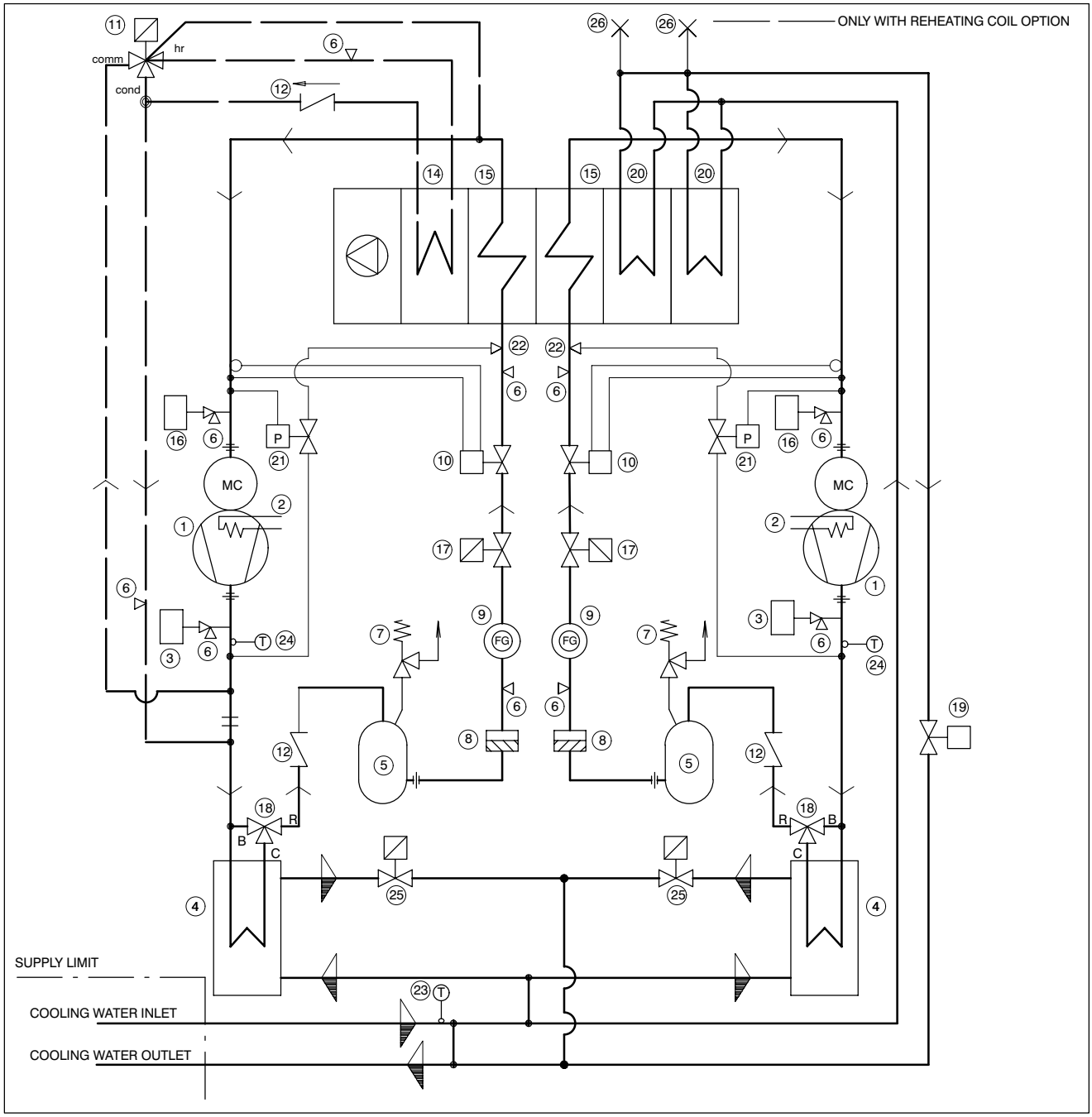
Fig. 14.10 – Liebert Hiross HPM M34–58 U/O F



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 2–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Solenoid water valve
26	Manual bleed valve

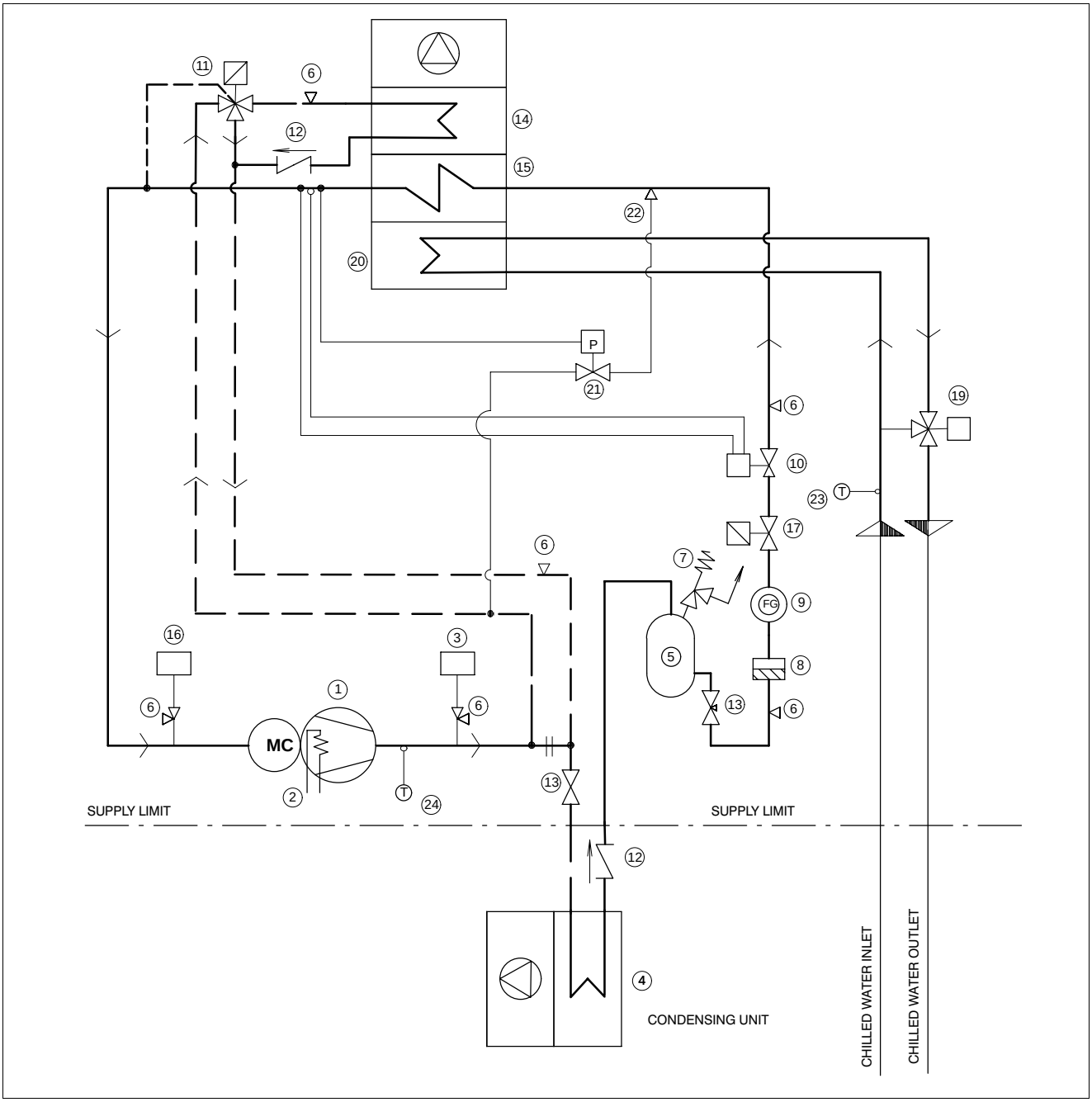
Fig. 14.11 – Liebert Hiross HPM L83 U F



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 2–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Shut–off solenoid water valve
26	Manual bleed valve

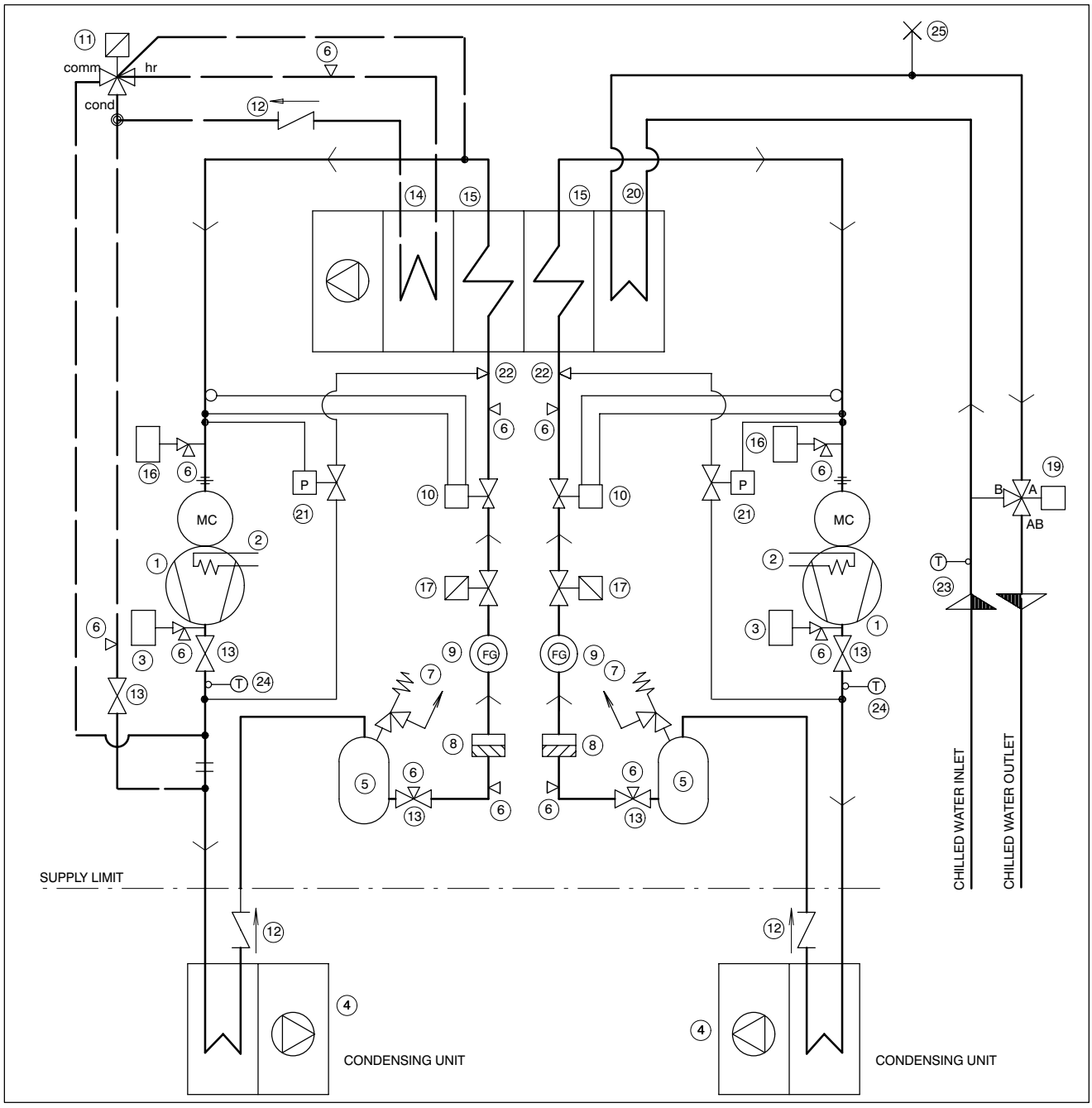
Fig. 14.12 – Liebert Hiross HPM Sxx U/O D, M25–47 U/O D



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	–
19	Chilled water 3–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Solenoid water valve

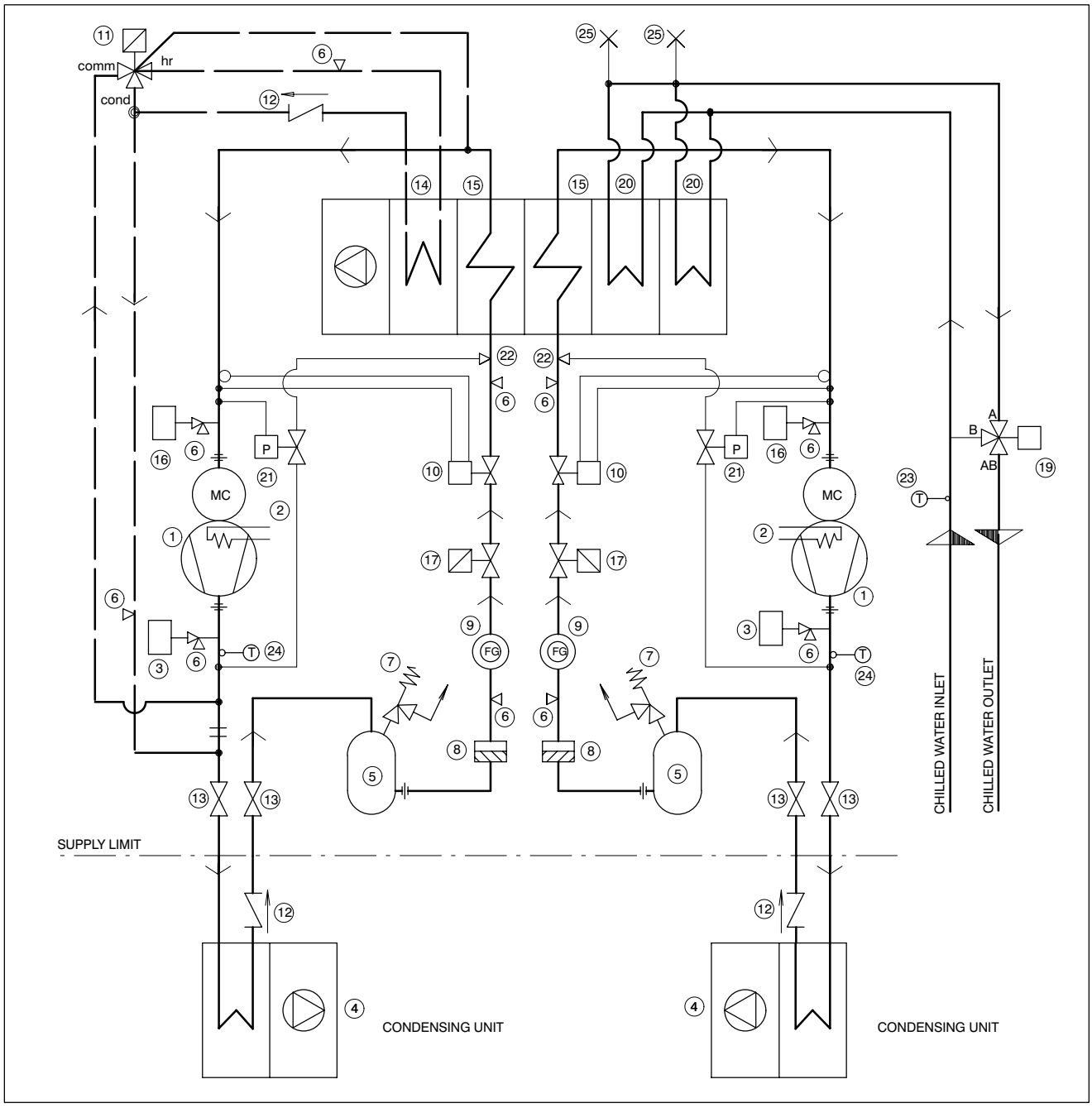
Fig. 14.13 – Liebert Hiross HPM M34–58 U/O D



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 3–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Manual bleed valve

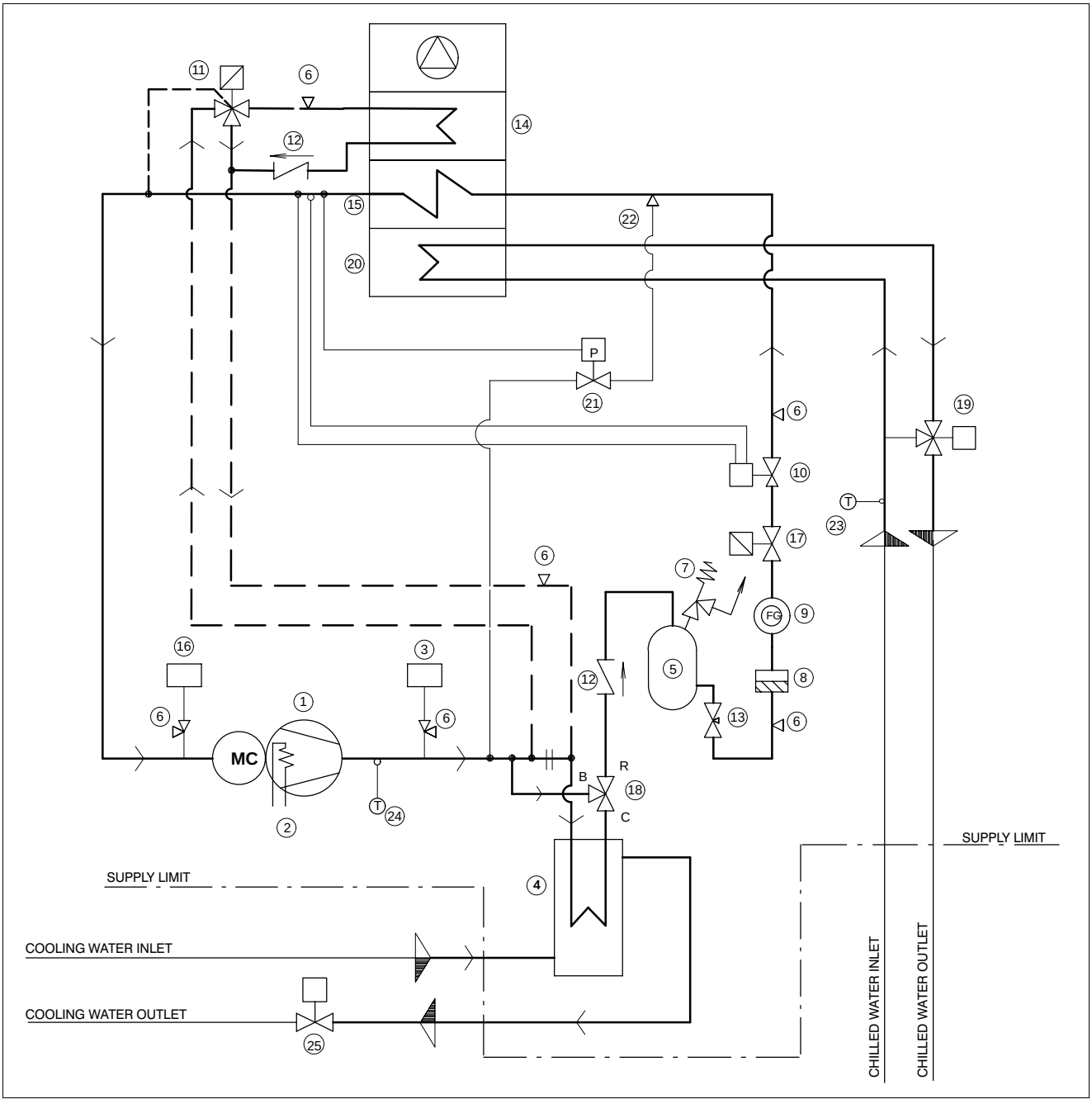
Fig. 14.14 – Liebert Hiross HPM L83 U D



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	–
19	Chilled water 3–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Manual bleed valve

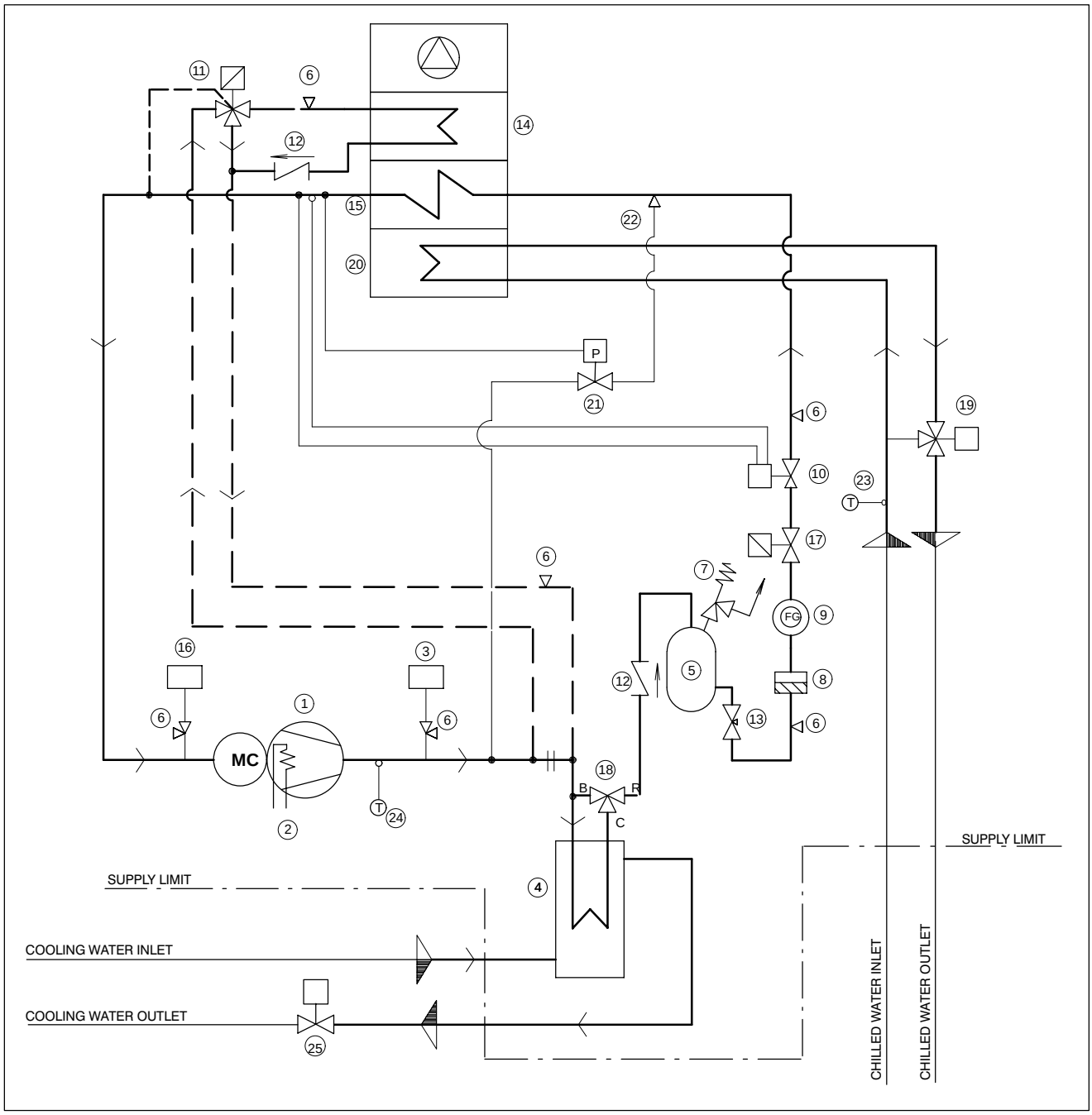
Fig. 14.15 – Liebert Hiross HPM Sxx U/O H



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 3–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Water solenoid valve (by the customer)

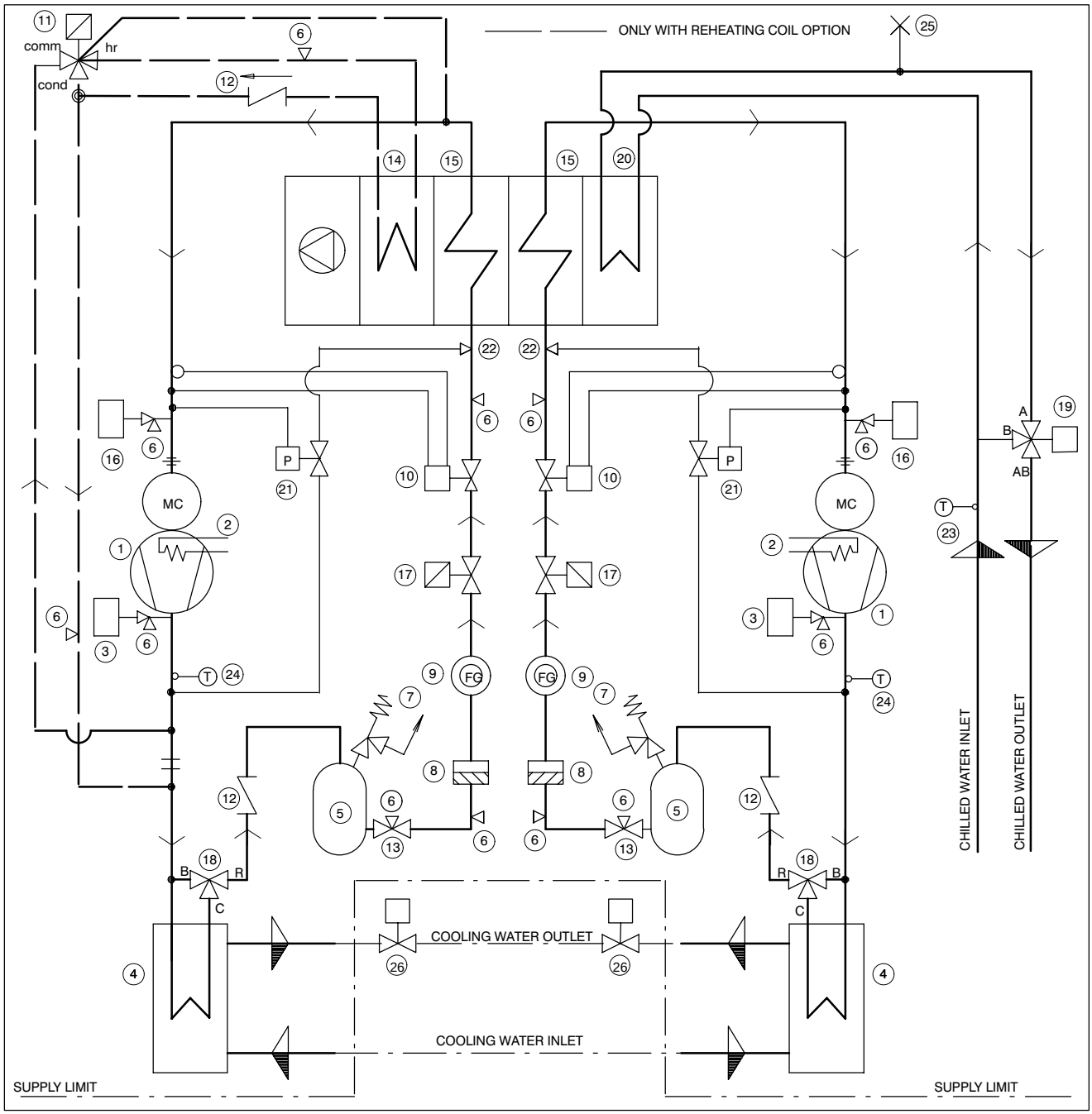
Fig. 14.16 – Liebert Hiross HPM M25–47 U/O H



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 3–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Water solenoid valve (by the customer)

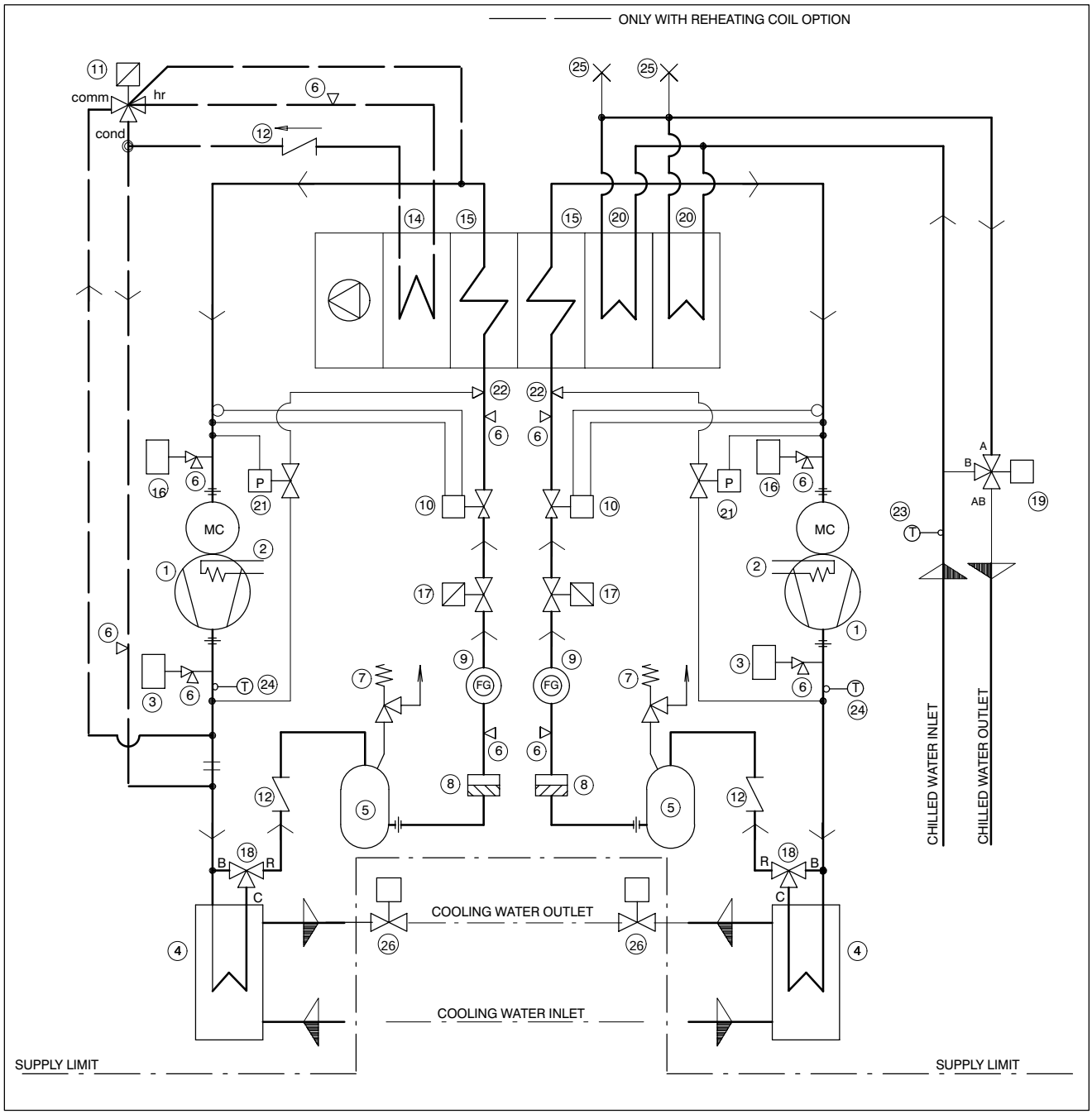
Fig. 14.17 – Liebert Hiross HPM M34–58 U/O H



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 3–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Manual bleed valve
26	Water solenoid valve (by the customer)

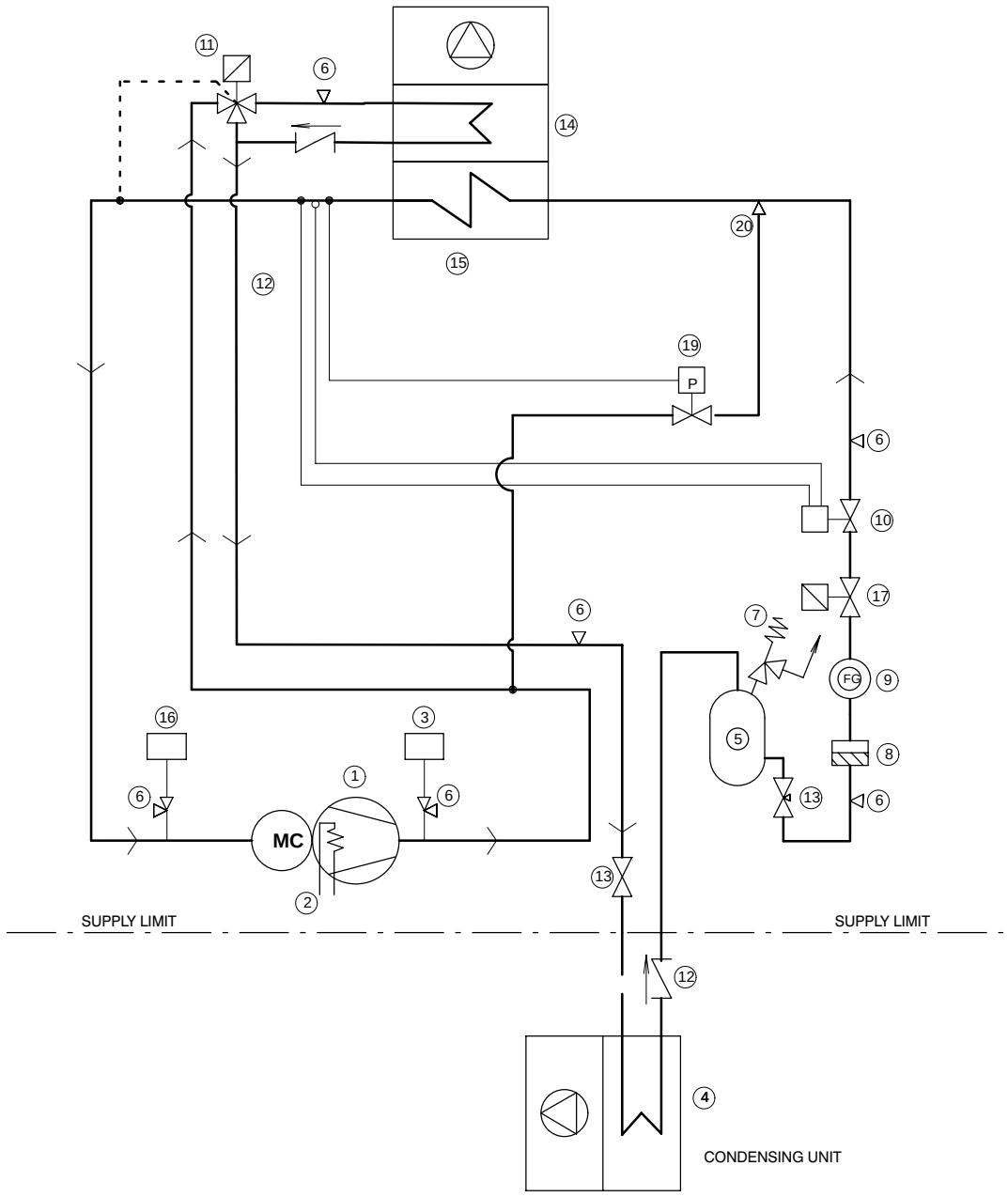
Fig. 14.18 – Liebert Hiross HPM L83 U H



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve
11	Hot gas ON–OFF solenoid valve (optional)
12	Check valve
13	Shut–off valve

POS.	DESCRIPTION
14	Reheating coil (optional)
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Chilled water 3–way valve
20	Chilled water coil
21	Hot gas injection valve (antifreeze)
22	Hot gas injector
23	Inlet water thermostat
24	Safety thermostat
25	Manual bleed valve
26	Water solenoid valve (by the customer)

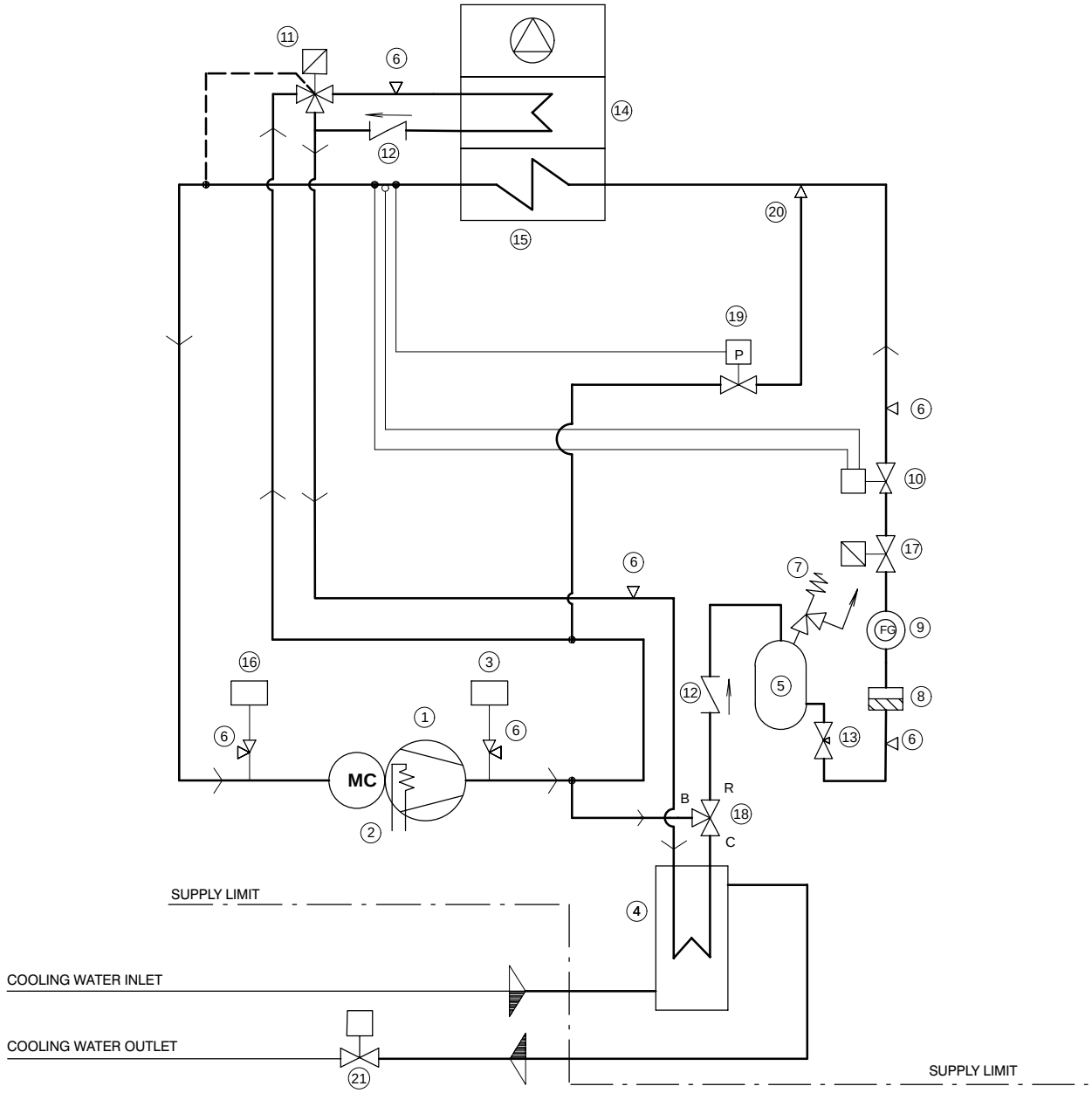
Fig. 14.19 – Liebert Hiross HPM Sxx KA, M25 KA



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Air cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	3–way hot gas modulating valve
12	Check valve
13	Shut–off valve
14	Reheating coil
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	–
19	Hot gas injection valve (antifreeze)
20	Hot gas injector

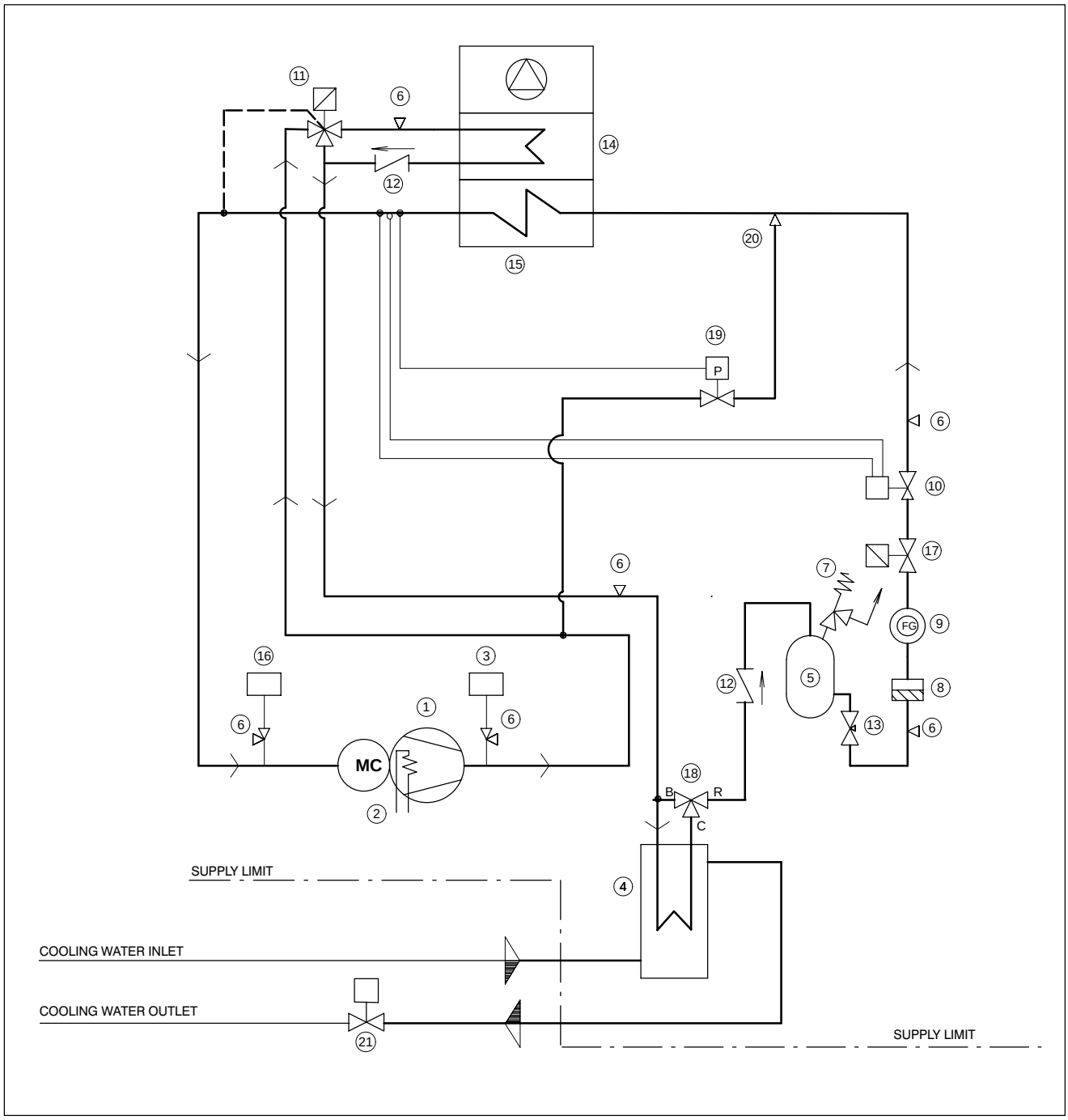
Fig. 14.20 – Liebert Hiross HPM Sxx KW



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	3–way hot gas modulating valve
12	Check valve
13	Shut–off valve
14	Reheating coil
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Hot gas injection valve (antifreeze)
21	Water solenoid valve (by the customer)

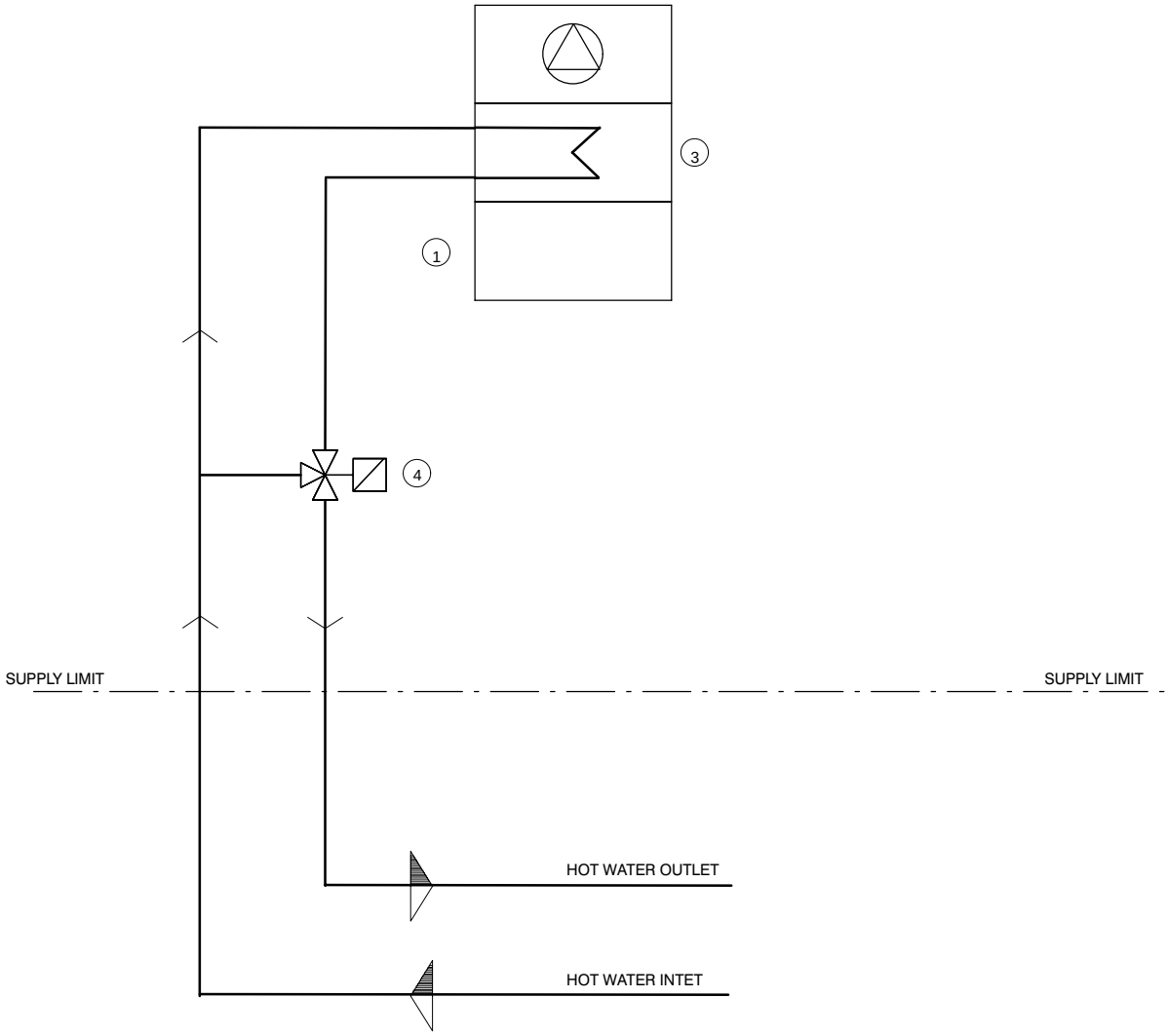
Fig. 14.21 – Liebert Hiross HPM M25 KW



POS.	DESCRIPTION
1	Compressor
2	Crankcase heater
3	High pressure switch (HP)
4	Water cooled condenser
5	Liquid receiver
6	Access valve
7	Safety valve
8	Filter dryer
9	Sight glass
10	Thermostatic expansion valve

POS.	DESCRIPTION
11	3–way hot gas modulating valve
12	Check valve
13	Shut–off valve
14	Reheating coil
15	Evaporator
16	Low pressure switch (LP)
17	Shut–off solenoid valve
18	Head pressure control valve
19	Hot gas injection valve (antifreeze)
21	Water solenoid valve (by the customer)

Fig. 14.22 Hot water reheating coil – optional



POS.	Optional components
3	Hot water coil
4	Hot water 3–way valve

Il Fabbricante dichiara che questo prodotto è conforme alle direttive Europee:
The Manufacturer hereby declares that this product conforms to the European Union directives:
Der Hersteller erklärt hiermit, dass dieses Produkt den Anforderungen der Europäischen Richtlinien gerecht wird:
Le Fabricant déclare que ce produit est conforme aux directives Européennes:
El Fabricante declara que este producto es conforme a las directivas Europeas:
O Fabricante declara que este produto está em conformidade com as directivas Europeias:
Tillverkare försäkrar härmed att denna produkt överensstämmer med Europeiska Uniones direktiv:
De Fabrikant verklaart dat dit produkt conform de Europese richtlijnen is:
Vaimistaja vakuuttaa täten, että tämä tuote täyättää seuraavien EU – direktiivien vaatimukset:
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